The
# Electrical Review

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## Reserve Plant and the Grid

WHEN the construction of the grid was first undertaken, it was realised by informed people that no immediate benefit could be expected from it. As the general manager of the Central Electricity Board pointed out in opening a debate at the Institute of Fuel last week, its immediate effect was to load the industry with £27 millions of additional capital expenditure.

The justification for this expenditure will depend upon whether the losses incurred in the early days are more than recouped by later surpluses within the set period of ten years. Mr. Hobson drew a logical deduction from economies already effected (subject to certain assumptions for the future) that the savings in capital charges on plant by interconnection and in coal by generating only in the most efficient stations would provide the requisite margin.

He did not overweight his argument by evaluating less readily calculable gains (*e.g.*, availability of supply), but one might question whether some of the spare plant likely to be released for active service in the near future has more than a paper value, even granting that £12 per kWh is a low figure. He excluded frequency standardisation on the ground that this would have been called for irrespective of the grid, and was undertaken by the Board merely as an administrative convenience.

Mr. W. A. Tookey's case against the grid rested very largely on the claim that much of the improvement expected would have been obtained without it, and that efficiency was probably approaching saturation point. We thought he might have made more of the possibility of loss of load to the grid through the competition of private plants, especially those embodying internal-combustion engines, regarding the merits of which he is so able an exponent, but he contented himself with recommending their use for building up loads to a point at which it became economical to tap the grid.

Mr. J. A. Sumner in his I.E.E. paper on the previous evening implied that undertakings, through lack of knowledge of private plant costs, might be stampeded into quoting too low rates to secure the load, but we do not think his suggestion of fixing a general minimum tariff a happy one. Low quotations are certainly no substitute for negotiating ability, but we prefer the method adopted by Mr. R. A. Thwaites of engaging an engineer with previous experience of putting the manufacturers' point of view.

The two discussions are related in that Mr. Hobson's case, essentially, was based upon an expectation of a continuance of the present rate of load increase. We have spent the £27 millions and cannot afford consumer saturation at some low level; only by preventing this can we provide an affirmative answer to the question under discussion.

How indisputable would the success of the scheme be, if savings due to a reduction of reserve plant were offset by an even greater expenditure on new active plant, both for generation and for distribution, as a result of the stimulus to electrical development provided by other savings and facilities due to the grid!

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**The London Supply Merger**

THE scheme for the amalgamation of six of the London electricity supply undertakings has now assumed definite shape, and the shareholders of the companies concerned have received particulars of the offer for their holdings. Some details of the financial proposals appear in this issue. Mr. C. Parker, general manager and secretary of the Westminster Electricity Supply Corporation, Ltd., who is the secretary of the new company (London Associated Electricity Undertakings, Ltd.), tells us that the scheme is to be an evolutionary, not a revolutionary, one, and it is hard to see how it could be otherwise if the supply is to be maintained. A commencement will probably be made in the sorting out of charges, and there is ample scope for ingenuity here. The aim, no doubt, will be to produce a uniform basis of working out fixed charges

and institute a common "unit" rate. Then there will also be opportunities of sharing the loads to make the best use of the existing systems. It will obviously be some time (probably years) before the undertakings will be welded into one homogeneous system. It is satisfactory to be assured that there is unlikely to be any displacement of staffs. The opportunities of increased business which a go-ahead policy should create will provide work for all the existing employés and, we hope, for a good many more.

**English Electric Recovery**

After the frequent references that have been made here during the past year to the improvement in heavy electrical engineering trade, readers may not be altogether surprised to note the satisfaction expressed in the report of the directors of the English Electric Company, which appears in our "City Notes." For the first time for several years there has been a substantial recovery in this class of business, and the company obtained its full share. Most encouraging is it to read that the inquiries being received by the industry for plant of all types, both for home and for overseas, suggest that the revival of demand is not of a merely casual nature.

**Electricity and Chemistry**

The most usual association of chemistry with electricity is in regard to accumulators, dry batteries, electroplating and certain furnace work. Electrolysis is another aspect that increases in importance, and Mr. C. M. Longfield's contribution to the I.E.E. *Journal* in January shows that its early interest to traction engineers has by no means abated with time. In cable work, too, the presence of moisture almost inevitably produces chemical effects, all of which are not immediately apparent. Then, again, electricity is being used to an increasing extent in the manufacture of chemicals, in view of the safety obtainable with the use of flame-proof apparatus. Such matters, if included within the scope of the Chemical Engineering Congress of the World Power Conference, to be held next year, should make the event of considerable electrical interest.

**I.E.E. Students**

The improved attendance at this year's meetings of the I.E.E. London Student's Section was a gratifying feature of Mr. H. T. Young's speech at its annual dinner. The average number present has been 123, compared with 69 last year, but even this higher figure is not so good a proportion of the metropolitan membership as those who have at heart the future of their profession would like to see. At the age of twenty-eight a student is due for transfer to the graduate classes, either by examination or by the possession of a special educational qualification. Failing this he may fall away from the Institution, as he is unlikely by then to have had the five years' experience in a responsible position required to earn promotion to the associate class. The initiative in such matters must come from him, since the Institution, as Mr. W. E. Butler reminded us, does not court publicity or tout for members, but anyone doing his share in this direction will meet with a most sympathetic response.

**Rural Difficulties**

There is a tendency to assume that supply authorities with rural areas are not doing all that they might to electrify those areas. This may sometimes be the case, for it requires courage to spend money on distribution work which may possibly be unremunerative for years. But the blame is not to be attached entirely to the electricity suppliers. Some of them have offered farmers full facilities, and yet cannot make headway. The Northampton Company may be cited as an example. Speaking at the company's annual meeting last week, the chairman (Mr. F. H. Thornton) said that they and their associated companies supplied an area of about a thousand square miles, mainly of an agricultural character, and the supply was within reach of nearly 90 per cent. of the population. They had a low tariff and assisted wiring schemes, and let out apparatus on hire and hire-purchase, and yet only 5½ per cent. of the 600 farmers connected used electricity for genuinely agricultural purposes. Mr. Thornton pinned his hopes of a better future on an improvement in agricultural conditions, but there is an obvious need of insistent propaganda and demonstration to break down the conservatism which is largely the handicap to development.

**Unequal Division**

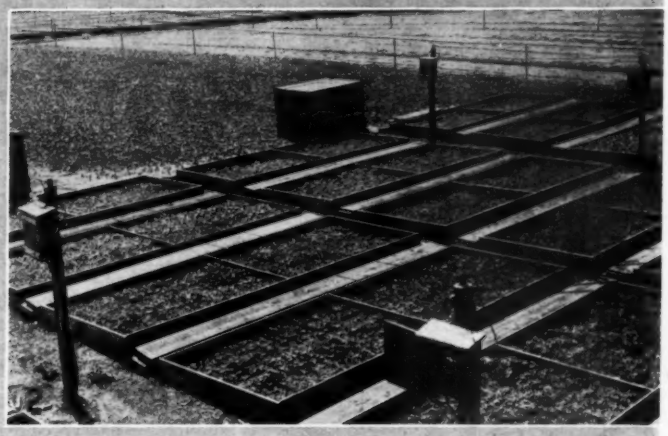
If we must await the Millennium to see the lion lie down with the lamb, how many æons must elapse before gas and electricity will run happily in double harness? In this country we have often seen the efforts of an electricity department cramped by its combination under one control with a gas undertaking, and these things are apparently ordered no better in America. Interviewed by an *Electrical World* representative recently, Mr. E. R. Acker, president of the Central Hudson Gas and Electrical Corporation, explained how the two sections of his company shared the business. He said: "We recommend to our customers gas for cooking, water-heating and house-heating, and electricity for lighting, refrigeration and other household appliances." He sees a closer co-ordination between the two services in the future, and instances "electric controls on gas ranges and water-heaters." Apparently the customers do not all follow the recommendations, however, for the Corporation enables consumers to purchase energy at 2.4 cents per kWh for "complete use of electricity, including refrigeration, cooking and water-heating." That, at least, is a point in the Corporation's favour, even if its allocation of business is a little lop-sided.

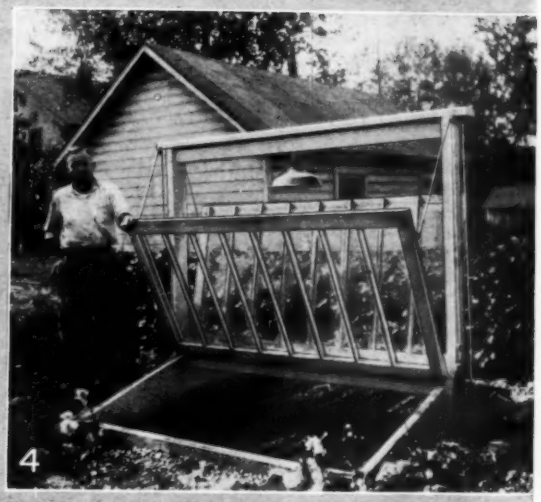
**Views on Electrification**

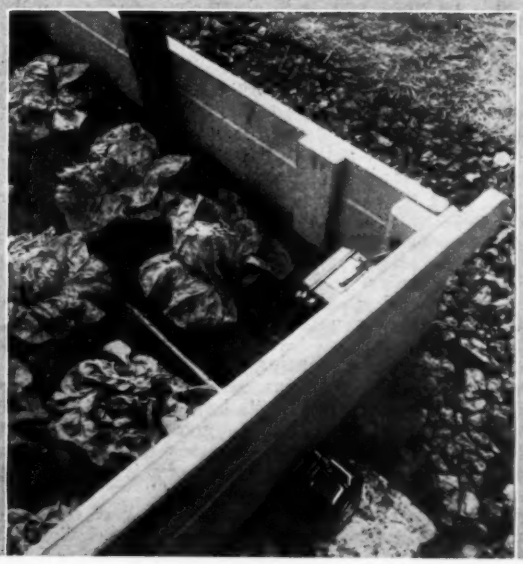
There is some difference of opinion among the railway companies with regard to electrification, due, no doubt, to the different characteristics of their systems. The Southern Railway, of course, has great faith in electric traction, as it has proved by its works, but the other companies are hesitant, if not entirely unfavourable. One system which cries out for electrification is the suburban lines of the London and North Eastern Railway converging upon Liverpool Street. The company has had a scheme for the electrification of these lines pigeon-holed for years, and yet at the recent annual meeting the chairman held out no hope of action. Sir Josiah Stamp, on behalf of the London, Midland & Scottish Railway, adopts a cautious attitude in the matter. At the company's annual meeting he said that they had 117 miles of electrified road in operation, but did not propose to spend much more money on electrification in the near future. Thus the prospect of further extensive schemes does not appear to be very hopeful, although the anxiety of the railway companies to secure the passage of the last Electricity Supply Act, which deals with bulk supplies for traction, made it look as though something might be afoot.

**Restrictions on Tenants**

The fight against the exclusion of gas or electricity from Council houses in favour of one or the other still goes on. The Chairman of the Brighton, Hove & Worthing Gas Co. had a great deal to say at the company's annual meeting regarding the Brighton Corporation's decision to restrict tenants of some of its houses to the use of electricity. He quoted evidence given for the company before a Parliamentary Committee purporting to show how unpopular all-electric houses were. From farther north (Lanark) comes news of a protest by tenants against the County Council's decision to permit the installation of gas only in its houses, the reason being that "the County gas undertaking cannot afford to lose any further consumers." While agreeing that the principle of restriction is wrong, we must say that the demand of the canny Scots for electricity seems to cancel out the gas man's suggestion that electricity is uneconomic.







**Soil Heating by Electrical Means.** **(See next page)**

1. Cable being laid in a German market gardener's hotbed (Siemens-Schuckert). 2. Twenty-four hotbeds, each 12 ft. by 6 ft., equipped with soil-heating cable and control thermostats (American G.E.). 3. The beneficial effects of electric heating in a greenhouse; the plants on the right are in cable-heated soil (G.E.C.). 4. A small electrically heated garden frame (American G.E.). 5. Forcing frames with thermostatically controlled heating maintained at 70 deg. F. (Siemens-Schuckert). 6. Early spring lettuces in an electrically heated hotbed showing clinker heat insulation and control thermostat (G.E.C.).

# Soil Heating by Electricity. By V. Sinclair

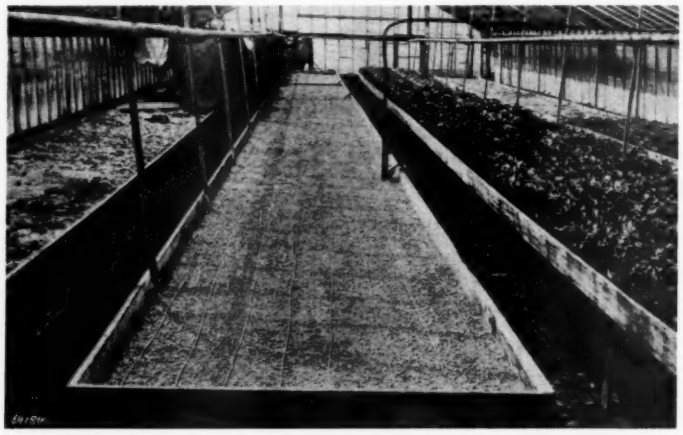
## A review of modern methods

UNTIL a few years ago fermented manure was the only medium employed for providing bottom heat to soil for forcing plants, bringing on seedlings and root cuttings, and for the early germination of seeds, but Norwegian experiments in 1922 led to the inception of soil-heating cables as a more convenient alternative.

The Scandinavians and Germans were the first to commercialise this method in Europe, and the General Electric Co. of Schenectady followed in America. This country lagged behind, until the General Electric Co., Ltd., introduced its "Magnet" cables some years ago. Since then, cables for the same purpose have been put on the market here by Siemens Bros. & Co., Ltd., W. T. Henley's Telegraph Works Co., Ltd., British Insulated Cables, Ltd., and one or two other cable makers who have not published data on the subject, whilst considerable impetus was given to the art by a valuable paper entitled "The Use of Electric Heating Cables for Hotbeds," by Mr. C. A. Cameron Brown, issued in 1933 by the Institute for Research in Agricultural Engineering of the University of Oxford.

Owing chiefly to climatic differences there is no international standard of practice, but an average practice has been adopted in other countries, and further experience will probably lead to the same here. The criterion of an installation anywhere will depend upon the desired excess temperature (dictated by the nature of the plants to be forced), the season, size and situation of the beds, and a number of other factors.

In the construction of the beds, practice is more or less uniform. The earth is excavated to a depth varying, according to recommendations of the cable makers and to the condition of the ground, from 6 in. to 12 in.; this cavity is filled with heat-insulating material such as ashes, clinker, coke or charcoal, which incidentally promotes drainage. The frame or light is placed on this insulation, and where the position is an exposed one the material is banked up round the sides; if necessary, a windbreak is added.



**Soil-heating cable in propagating bench before being covered with soil (American G.E.)**

This method of heat conservation has effected considerable savings in electricity, according to the nature of material employed and its arrangement, amounting to as much as 30 per cent. in Sweden with about 8 in. of wood charcoal. A layer of sand about 1 in. deep is then spread over the insulating material inside the frame; the cable is laid on this and another 1 in. is laid over the cable. The object of the sand is to distribute the heat more uniformly than if the cable were laid directly in the soil.

Then a small-mesh wire netting is placed over the sand, to protect the cable from mechanical damage from fork or trowel, and finally the soil is filled in. The depth of the latter differs considerably. In Germany about 12 in. is recommended; the G.E. of America suggests 3 to 5 in.; whilst English cable makers give depths varying from 6 to 12 in. But after all, the depth of soil will chiefly be dictated by the nature of the plants grown in it, and the roots that they make.

### Lengths, Spacing and Loading

The space between cable runs, which are zig-zagged across the bed or in the direction of its length, may be anything from 4 to 12 in., but certainly not more. Experience has shown that 6 to 7 in. is a good average spacing for uniform heat distribution; but loading per unit area is the criterion, not the arbitrary laying of a length of cable.

A soil-heating cable consists of a conductor of resistance wire (Felten & Guilleaume mention a copper-nickel alloy, but other makers are silent on this point) variously wrapped with asbestos tape or yarn, which is then covered with impregnated paper tape (the G.E.C. uses varnished cambric). A lead or lead-alloy sheathing is then applied, and this is rendered corrosion-proof. In addition to these more or less standard coverings, Siemens Bros. & Co. supply short lengths (10 yd.) with a further sheathing of "Stannos" tinned copper tubing, and Siemens-Schuckertwerke something similar. This tubing gives the cable a certain rigidity, so that it can be set up in any particular lay-out before installation. The standard cable of Felten & Guilleaume is lapped over the lead sheath with two layers of aluminium tape, compounded and paper taped.

### Continental and American Practice

Continental makers do not approach the problem from the point of view of standard lengths, as here and in America, but from an average standard loading per unit area derived from experience. The British makers produce the cables in lengths of from 25 to 150 ft., with loadings of from 3.33 to 6.66 W per ft. The American General Electric makes one type of cable only, but not in standard lengths; it recommends, as a basis, 60 ft. for beds up to 32 sq. ft. and 120 ft. for 72 sq. ft., the loading per foot being 6.66 W.

Two of the largest makers of soil-heating cable on the Continent are Siemens-Schuckertwerke and Felton & Guilleaume. The former runs a cable having a resistance of about 9.35 ohm per ft., the latter lists four types of cables with resistances equivalent roughly to 0.136, 0.183, 0.275, and 0.55 ohm per ft., compared with 0.5 ohm for the British 700-W type and 0.55 for the American. But here our comparisons end, for the practice is to use an empirical heating load which is based on extended experience, involving a consumption of 50 Wh per deg. C. per sq. metre per day. In Germany, as the early spring temperature lies around freezing point, and an over-temperature of 20 deg. C. (68 deg. F.) is generally required for the beds, this implies an average consumption of 1 kWh per sq. m. per day, or 1.2 kWh to allow for exceptionally cold waves. It has been found that temperature can be maintained within small limits with eight hours' running, involving a consumption of from 125 to 150 or 160 W. per sq. m.

The loading of the cables is from 20 to 25 W per metre run, so that six to seven runs of cable are required per sq. m. As a general rule, every 1,000 W connected corresponds to 50 m. of cable and to 6 or 7 sq. metres of bed. The manufacturers have worked out scales and curves from which, for a given voltage and area of bed, the necessary length of cable can be read off.

Thus the main difference between British and German practice is that in the former standard lengths and loadings are offered which have to be adapted to the beds, whereas on the Continent an empirical load per unit area is taken to give a definite temperature, the length and type of cable for each area being calculated from graphs. American practice, as represented by the largest makers, takes a half-way position.

The following approximate loadings and running hours under average conditions are given for "Magnet" cables:—

| Running hours per day | 8 | 10 | 12 | 16 | 20 | 24 |
|---|---|---|---|---|---|---|
| W per sq. ft. ... ... | 14 | 11 | 9 | 7 | 5.5 | 4.5 |

The G.E.C. has published a table of cable equipment for standard size frames, to obtain loadings of from 5 to 10 W per sq. ft., the higher loadings being recommended for thermostatic control and short-hour operation. Siemens Bros. specify 100 W for 24 sq. ft. continuously for twenty-four hours to retain normal soil temperature, equal to 4.15 W per sq. ft. Henley's state that their 750-W cable will deal adequately with 16 sq. yd. of soil only if left on for twenty-four hours in cold weather; this represents about 5.2 W per sq. ft. The B.I. Co. suggests one 700-W cable for 50 to 60 sq. ft. for eight hours' running, or three times that length for twenty-four hours, representing 11.6 to 14 W per sq. ft. and 3.85 to 4.65 respectively. The before-mentioned recommendation of the G.E. of America is equivalent to 11.1 W per sq. ft.

As regards the German makers, Siemens-Schuckertwerke specify definitely a loading of 11.6 W per sq. ft. to maintain a temperature of 68 to 70 deg. F. with eight hours' running per day; for plants requiring more heat or in particularly cold situations, this must be increased to 14 to 15 watts per

sq. ft. Felten & Guilleaume take as a basis load 1.2 kWh per sq. m. per day; this is equivalent for eight hours' running to 14 W per sq. ft.

While there is general agreement as to load per unit area, English makers, as yet without large-scale experience, are inclined to rely on "trial and error"; American loading is on the high side, and Continental practice is precise, the loading increasing as one goes northwards.

In meeting the requirements of amateurs certain English manufacturers have shown enterprise. The usual frames employed are 3 by 4 ft. and 6 by 4 ft. One G.E.C. 25-ft. cable with a 115-W loading will deal with one or two of the smaller size at 10 and 5 W per sq. ft. respectively, or two cables will deal with two small or one large frame at 10 W per sq. ft. One Siemens 10-yd. cable with a 200-W loading is recommended for frames up to 6 by 4 ft. (minimum 8.3 W per sq. ft.), and in addition this company supplies a 10-yd. self-regulating cable of the same loading, with self-contained thermostat available in temperature ranges of 50, 60 and 70 deg. F.

Finally, Messrs. H. Church & Co. (Essex), Ltd., supply a rigid "heating unit" complete with control gear, which is placed on the layer of heat insulation before the frame is put into position. These units are listed for two sizes of frames and for hand switching with one heat, with three heats and for automatic control, the loadings ranging from about 2 to 10 W per sq. ft.

### Results Obtained in Germany

Information regarding results in Germany was given in an article by Dipl.-Ing. Fr. Mörtzsch in *Elektrizitätswirtschaft* of August, 1931, which showed yields of lettuce and cucumbers with electric heating and manure beds:—

| Place. | Plants. | Yield | | | |
|---|---|---|---|---|---|
| | | with electric heating. | | with manure beds. | |
| | | Quantity. | Proceeds RM. | Quantity. | Proceeds RM. |
| Kirchwärder-Fünfhausen Experimental Grounds... | Lettuce ... | 460 | 68.10 | 460 | 32.10 |
| | Cucumbers | 300 | 159.00 | 300 | 50.00 |
| Clemens Nursery, Pirna ..... | Lettuce ... | 960 | 81.50 | 960 | 74.00 |
| | Cucumbers | 235 kg | 125.55 | 190 kg | 99.10 |

At the Teller Nurseries at Frankfurt lettuce grown with electric bottom heat matured three weeks sooner than that grown in manure beds. The power consumption was 1.4 kWh per head of lettuce, and a considerably higher price was earned due to earlier development. Experiments made in the district of the Elektrizitätswerk Schlesien A.-G. proved that electric hotbeds required only one-half the usual time for forcing. A head of lettuce yielded 30 pf. against 15 pf. for those grown in manure beds, and the consumption was 1 kWh per head. Similar results were obtained in the district of the Schlesische Elektrizitäts-und Gas A.-G., Gleiwitz. In experiments in the Strehlen Nurseries (Krs. Geldern) the lettuce was ready for sale eight to ten days earlier. Mörtzsch also gave the following empirical costs per sq. metre for the construction and equipment of electrical hotbeds: Construction of beds, 12 Rm.; cable, 3 Rm.; other installation costs, 6 Rm.; total, 21 Rm.

He showed from various concrete cases that the average cost per sq. metre of making manure hotbeds are: manure, 1.90 Rm.; stacking, 0.40 Rm.; construction of beds, 12.00 Rm.; total, 14.30 Rm.

About 0.25 Rm. per sq. metre can be allowed for the sale of spent manure, so that each renewal may be reckoned at 2.05 Rm. per sq. metre. With interest at 10 per cent. and depreciation at 10 per cent. for beds, 25 per cent. for cable and 10 per cent. for other electrical materials, then for a forcing period of forty-five days with 1 kWh consumed per sq. metre per day and two lots of manure, the running costs just about balance with current at 4½ pf. per kWh (just under 0.5d.) in the first year of a new installation. If, in the following years, less is allowed for interest as the capital cost is written off, balance can be attained with electricity at a higher price. But if the beds are already in existence and have been entirely written off, he shows that 4 pf. per kWh is necessary to attain balance in the first year. It is clear, therefore, that capital charges influence working costs much more than price of energy, so that hopes for the future lie chiefly in reducing installation costs.

These comparisons have not taken into account the economic advantages already well proved, of electrically heated hotbeds over manure beds. Horticulturists in Germany admit that the former are an economic proposition with electricity at 6 pf. per kWh (about 0.6d.). English experts will no doubt agree that, apart from the excessive rate of interest allowed, other factors which may be peculiar to this country seem to show that electrically heated hotbeds are worth while even with electricity at 0.75 per kWh. But it might pertinently be asked whether some public authority such as the E.D.A. could not take up the question and put the practice of electricity for bottom heat on an empirical basis for commercial purposes.

# The London Electricity Supply Merger

As we have already reported, six of the London electricity supply undertakings have formulated a scheme for the amalgamation of their businesses in the interests of efficiency and economy.

A company has been formed under the title "London Associated Electricity Undertakings, Ltd.," with a nominal capital, to acquire the preference and ordinary shares of the companies concerned which are: The Brompton & Kensington Electricity Supply Co., Ltd., the Charing Cross Electricity Supply Co., Ltd., the Chelsea Electricity Supply Co., Ltd., the Kensington and Knightsbridge Electric Lighting Co., Ltd., the St. James' & Pall Mall Electric Light Co., Ltd., and the Westminster Electric Supply Corporation, Ltd.

This company has made an offer to the ordinary and preference shareholders of the associated companies for the purpose of acquiring their holdings. The object of promoting the new company was to secure the necessary machinery for the efficient management and development of the areas supplied by the associated companies, so that the combined resources of the whole would be available for further development in the most economical manner possible.

The board of the new concern, it is stated, is confident that while still preserving the structure of the associated companies, a centralised control can direct a uniform policy throughout the area and can secure a higher degree of efficiency with more economical distribution.

The basis of the offer to be put to the shareholders is an exchange of shares of the existing companies for stock carrying similar rights in the new company. The ordinary shareholders of each of the associated companies will receive an equivalent amount of ordinary stock in the new company. The preference shareholders will receive an appropriate amount of either 6 per cent. or 4½ per cent. preference stock in the new company in exchange for their existing holdings. In no case will the rights of the preference shareholders be prejudiced; in fact, in some cases they will obtain a slight benefit.

In the event of a majority of 90 per cent. of the various classes of shareholders accepting the proposal, a virtual amalgamation of the six companies with a total capital of £7,000,000 will be effected at a cost estimated at less than £10,000. The details of the scheme have been prepared by Messrs. Deloitte, Plender, Griffiths & Co. The offer which has been submitted to the shareholders has received the unanimous approval of the boards of each of the associated companies who recommend acceptance.

In the event of the offer being accepted the issued share capital of the London Associated Electricity Undertakings, Ltd., will be increased to enable the necessary amount of 6 per cent. and 4½ per cent. cumulative preference shares and ordinary shares to be available. For convenience the shares in the new company will be converted into stock (in units of £1) as soon as allotted. Each unit, whether preference or ordinary, will entitle the holders to one vote in a poll.

The individual companies are sending particulars of the scheme to their shareholders, who are asked to signify their acceptance of the offer by April 6th. The terms of exchange vary; the information so far available is as follows:—

*Westminster Electric Supply Corporation.*—One 4½ per cent. cumulative preference share for each £1 of 4½ per cent. cumulative preference Westminster stock and one ordinary share for each Westminster ordinary share.

*Charing Cross Electricity Supply Co.*—One 4½ per cent. cumulative preference share for each 4½ per cent. cumulative preference Charing Cross share. One ordinary share for each Charing Cross ordinary share plus 6d., less tax, in respect of the amount standing to the credit of the company's No. 2 reserve fund.

*St. James' & Pall Mall Electric Light Co.*—Seven 6 per cent. cumulative preference shares for every six 7 per cent. non-cumulative preference shares and one ordinary share for each St. James' ordinary share.

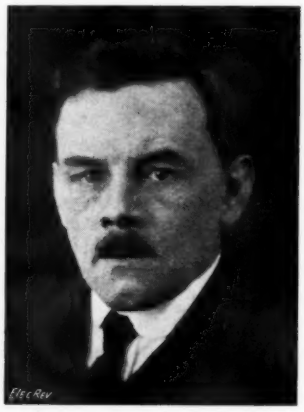
*Kensington and Knightsbridge Electric Lighting Co.*—Five 6 per cent. cumulative preference shares for each £5 6 per cent. first cumulative preference Kensington share; eleven 4½ per cent. cumulative preference shares for each £5 5 per cent. second preference share; one ordinary share for each Kensington ordinary share.

# Lighting for Small Consumers. By C. H. Hird, A.M.I.E.E.

## Progress of the fixed-price scheme

DURING recent years a great deal of attention has been given to the encouragement of the use of electricity for domestic purposes, and in some districts the cooking and heating load has already reached such proportions that the maximum demand on the undertaking occurs on Sunday mornings.

Far less attention is being given to the extension of the purely lighting load, except where it is anticipated that the introduction of electric light will lead eventually to the use of electricity for other purposes. There is nevertheless a wide field awaiting development, especially in crowded industrial districts, where families must be content to occupy two or three rooms only and where, at present, gas has practically a monopoly.



Mr. C. H. Hird is engineer to the Fixed Price Light Co., whose work he describes

In these cases the facilities offered for free wiring and low domestic tariffs yield no results, as an installation which would meet the needs of such consumers is nearly always below the minimum of four or five lighting points usually specified. Nor can it be expected that among this class of consumer there will be any considerable demand for electric cooking. A family living in two or three rooms will use one of these as a combined kitchen and living room. A fire in this room is a necessity throughout the winter months and naturally enough it is used for cooking.

For installations of two or three lights the cost of the service and meter is out of all proportion to the value of the electricity consumed, especially in the case of consumers occupying upper floors, when a rising main must be provided. Supply authorities, therefore, by specifying a minimum number of points in their assisted wiring schemes and by requiring a minimum quarterly consumption, guard themselves against this unprofitable load.

### Profitable Consumers

But although such consumers are unprofitable individually, in the aggregate they are a far more desirable load than the large lighting consumers. Small installations are not burdened with "convenience" points. The maximum demand is low and the burning hours long. Actual tests on groups of about a dozen such small consumers supplied from a common service with unmetered electricity have shown that their average load factor is 38 per cent. These possible small consumers are willing to pay for their light at rates more than sufficient to meet the charges on their installations and the cost of the energy consumed. They cannot, however, afford to pay such a charge as will justify a separate service and meter.

Small property wired by the company, showing the unobtrusive nature of the installation

The first essential of a scheme for developing this load is some system for connecting small consumers together in groups, each supplied from a single service. This has long been recognised and more than twenty-five years ago the Fixed Price Light Co., Ltd., was formed to operate a scheme for providing small consumers with electric light on such a system. In its early days the operations of this company were frequently referred to in the ELECTRICAL REVIEW, and the following review of the growth of the system to the present day confirms the soundness of the basic ideas on which it was founded.

In 1909 a paper on "The Present Aspect of Electric Lighting" was read before the I.E.E. by Messrs. H. W. Handcock and A. H. Dykes. At that time the new metal filament lamps had just been introduced and their amazing efficiency as compared with the established carbon filament lamp opened new possibilities in the field of domestic lighting. The authors of the paper were able to show that the cost per unit, the running charge, was no longer a decisive factor in the total cost of electric lighting and that for very small consumers it might be an almost negligible factor. After pointing out that the value of the energy consumed by a small lighting installation was hardly worth the cost of metering, the authors said: "For the reasons above set forth, we believe that all stations having normally low running costs could, with great advantage to themselves, supply the long-hour consumer, who at present generally uses gas, at a fixed charge per lamp per annum. . . ."

This idea of a fixed inclusive charge per lamp, with the essential grouping together of consumers mentioned above, forms the basis of the company's system, under which no customer is too small to be profitably supplied. The records of the company show that many thousands of consumers, each with only one lamp are served. On its inception, the company operated in the Waterloo and Rotherhithe areas in South London, and when the outbreak of war checked its activities, was running an installation of about 4,000 lamps. Development was resumed in 1925 and the system introduced into other districts, which now include Poplar, Barking, Willesden and Gillingham, and parts of Lambeth, Southwark, Deptford, Camberwell and Paddington.

Electricity for the use of its customers is purchased from the supply authority for the district by the company which also wires the customers' premises and connects them, by means of mains fixed to the surface of the buildings, in groups to agreed points of supply. From the 4,000 lamps connected in 1924 the business has steadily grown until at the end of 1934 the total was 79,000.

The average number of lamps per customer is 2.85, and the increase during the last two years has been at the rate of 2,660 new consumers per annum.

The rates charged to the consumer are based on the number and size of the lamps connected on his premises. These rates are inclusive, covering the installation charges, maintenance, lamp renewals and the cost of all electricity consumed. A staff of collectors is employed, each collector being required to call on 800 to 1,000 customers every week. If payment is not forthcoming after a suitable interval, the supply is disconnected. Any complaints or requests from customers made to the collectors, such as for lamp renewals, extensions, disconnections or reconnections, are handed in to the local office and dealt with by the maintenance staff.

There is no doubt that the system of collecting week by week, although expensive, has helped largely to make the undertaking a success. The consumers are almost exclusively weekly wage-earners and prefer to make a fixed weekly payment rather than meet quarterly accounts.

The work of installation is carried out by contractors under the company's direction. The "Stannos" system of copper-sheathed rubber insulated cable is used both for inside wiring and for the distribution mains, which serve to connect the consumers in groups to each point of supply. This system was adopted for two reasons. The maintenance of the installation being a permanent responsibility of the company, it is found best to provide a durable system of wiring which will be free from condensation troubles and which will resist mechanical injury. It is also an advantage in some cases where

the supply is a.c. to utilise the concentric system of wiring. "Stannos" wire is well adapted for this purpose, the outer sheath making an excellent return conductor. Concentric wiring must, of course, be isolated from the supply mains by means of a double-wound transformer, with one pole of the secondary winding earthed at each service point. This type of wiring is somewhat cheaper to install than the ordinary double wiring. It is equally durable and distinctly safer, as any neglect on the part of the wiremen in the efficient bonding and earthing of the sheathing will be at once detected. A further advantage is that the distributing main consists of one wire only (usually 7/.036) with an outside diameter of ¼ in., and its unobtrusive appearance on the surface of the buildings helps in securing the necessary consents and wayleaves from property owners.

The points which appeal to supply authorities in providing a bulk supply to the company are that no capital outlay on the authorities' part is required; that the revenue is secure and is obtained without the necessity of reading large numbers of meters, rendering and collecting accounts, or the incurring of bad debts; that the supply to the company will be a net increase to the output of the undertaking and will be obtained without any expense for advertising or canvassing; and that it will dispose of more than 3,000 kWh per annum for each kW of load connected.

In almost any industrial area very considerable quantities of electricity can be absorbed by the possible small lighting consumer. The energy purchased annually by the company has risen from 310,400 kWh in 1924 to 10,574,700 kWh in 1934. As the total connected load at the end of 1934 was only 3,163.7 kW, it will be evident that if the system were expanded to include all the suitable areas, the kWh required would be a substantial proportion of the total domestic consumption in this country.

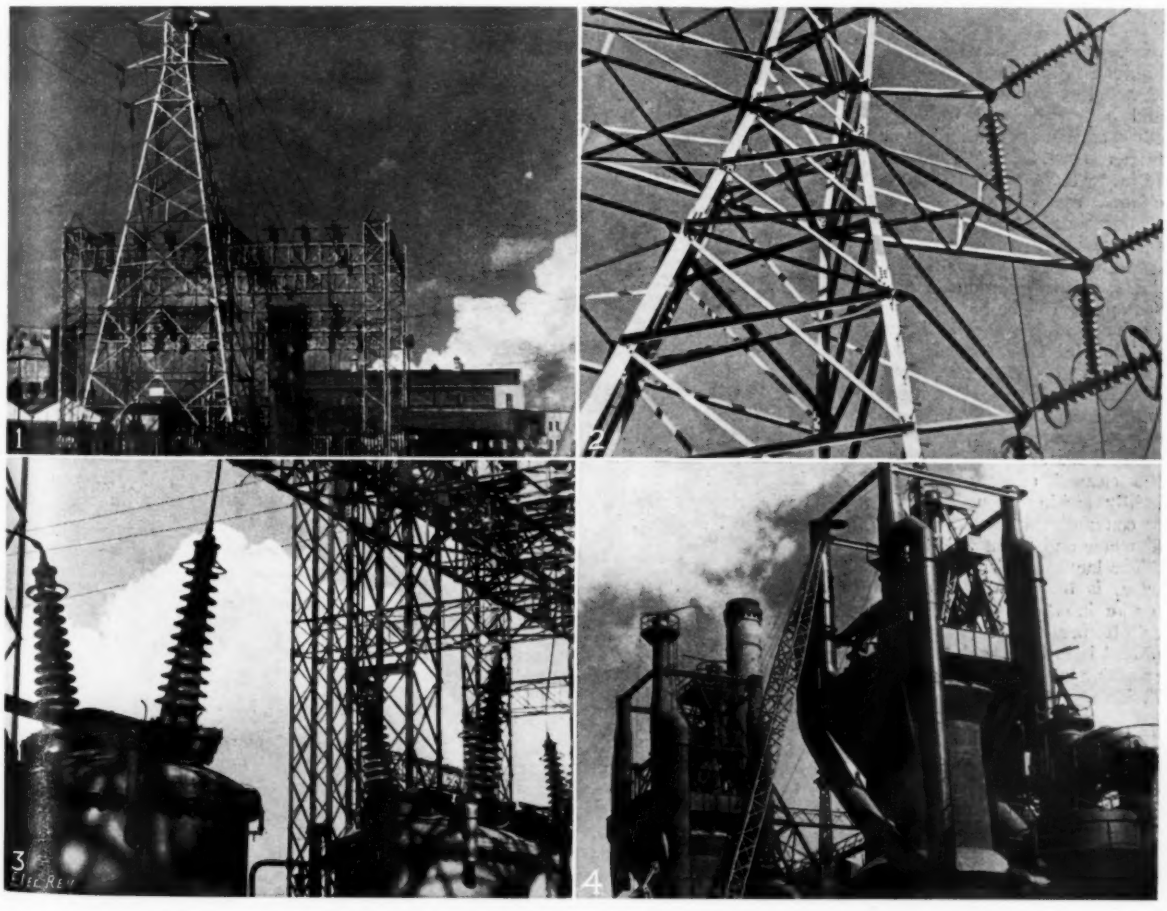
The supply of unmetered electricity need not be limited to lighting only; other appliances having comparatively low ratings, such as radio apparatus, vacuum cleaners, refrigerators, and even electric irons can safely be connected. In the class of consumer here considered, however, there is not much demand for anything beyond lighting and supplies for radio sets, which tests have shown to require an average of 498 W.

Distribution by mains fixed to the surface of the buildings is adopted by a number of supply authorities, apart from the provision of unmetered electricity to small consumers, especially on new housing estates. The economy is very considerable, as the work can be carried out at about one quarter of the cost of corresponding distributors laid underground. It is convenient for supplies in unimportant side turnings, where a service point can be fixed at the corner house of the main road. Runs of 150 yd. are quite feasible, or if a supply is taken at 400 V and transformers are fixed at convenient points along the route even longer stretches may be supplied.

For such work a suitable system should be selected. Wiring on cleats, as is too often installed, is unsightly, very liable to mechanical damage and may even be a source of danger to workmen when painting or repairing the buildings.

## Electricity on the Screen

THE films produced by the Electrical Development Association are propaganda naked and unashamed and are therefore suitable only for exhibition to selected or specially invited audiences. To spread the electrical idea over a wider area something less direct is necessary—something which the cinema exhibitor can include in his ordinary programme. A new film called "The Face of Britain" which is being made by Paul Rotha for the Gaumont-British Instructional Co. and which will be ready in a few months' time should prove an effective ally in the cause of public education. This film, in the making of which the Central Electricity Board has collaborated, is claimed to be the first "documentary" film, outside Russia, which deals with a national theme. The producer has designed it with a view to answering the questions which the ordinary man is beginning to ask himself about public affairs. It is neither political nor industrial propaganda but a review of the past of rural and industrial Britain, and of the new Britain which is being gradually created by the agency of electricity, steel, glass and concrete. Our illustrations are reproduced from "stills" of the film.



**From the Film "The Face of Britain"**

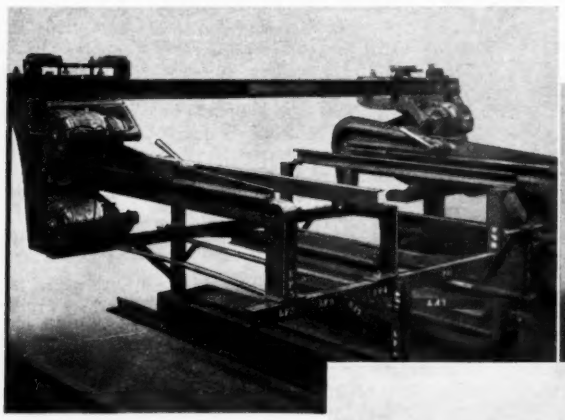
1. A grid sub-station supplying iron and steel works. 2. A grid tower. 3. Steelwork and porcelain insulators in a grid sub-station. 4. Blast furnaces at Corby

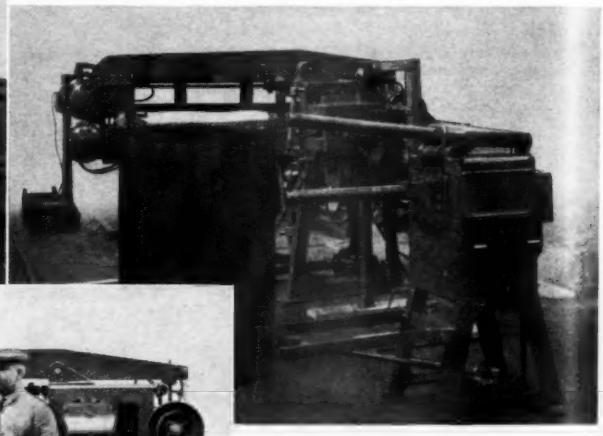
# Electric Welding Plant

## Constructional features of British equipment exported to Ceylon

An electric welding outfit that is to be employed for fabricating mild-steel sheets in drums to serve as oil containers has just been completed by the Westminster Engineering Co., Ltd., for export to Ceylon. The equipment is in three parts, namely, a preliminary scaling machine, an intermediate spot tacker, and a main seam welder.

The scaling machine consists of a wheeled truck or chassis on rails, serving as a frame on which to secure a steel plate squarely by means of convenient clamping devices at each end. Spanning the chassis is a bridge girder from which four small motors are suspended on rollers, each chain driving a spring-mounted grinding wheel, forming a pair on each side.





**The illustration on the extreme left is of the preliminary scale removing machine. On the right is the intermediate spot weld tacking machine standing in front of the main welder, which is shown separately in the remaining picture**

As the chassis moves to and fro the edges of the steel plate pass between the grinding wheels. The scale is thus removed from the top and bottom surfaces of the two edges simultaneously and rapidly, fifteen seconds sufficing for a 74 in. by 36 in. plate. Surfaces so cleaned can be welded without further preparation to make air-tight seams.

The machine can, if desired, be made to reverse automatically, so that plates can be loaded and unloaded at the same end. It is adjustable for size of plate; sheets of uneven thickness can be cleaned; and both thick and thin plates can be de-scaled without resetting. Furthermore, the capital outlay and operating cost are lower than for sand-blasting equipment.

Next, the steel sheets are curved to cylindrical form, with the cleaned edges overlapping 0.25 in., and held so by lightly tacking them together with an electric spot welder of conventional design. The cylinder so formed is 30 in. in diameter and has a wall thickness of 0.056 in.

The longitudinal lap seam, which is 52 in. long and 0.25 in. wide, is finally welded electrically by a machine designed for an input up to 45 kVA and a normal welding speed of 3.25 ft. per minute (taking 18 kW), though a demonstration proved it to be capable of making a sound seam without side splashing at a welding speed of 4.1 ft. per minute (taking 22 kW).

### A Long "Stroke"

When designing a machine with so long a welding "stroke" care must be taken to prevent the long leakage circuit from unduly affecting the power factor, and also to avoid the risk of any progressive deterioration of the weld towards the end of the "stroke," which tends to result from the large choking effect produced as the drum is inserted between the jaws of the machine.

The transformer is housed within the body of the machine and is easily accessible. Tappings on the primary winding provide thirteen voltages (and therefore welding speeds) in the secondary circuit formed by the welding jaws. The "head" consists of two rotatory copper disc electrodes, both of which, as well as both jaws, are water-cooled by internal circulation. The stationary lower jaw is made of non-magnetic metal in order to minimise the impedance of the circuit.

The lower electrode rotates by rolling friction, while the upper is power-driven through gearing and a shaft is flexibly coupled along the upper jaw, which is hinged to permit of the application of welding pressure. This is applied by means of a lever with a long arm. The lever is operated by a foot pedal and held down by a heel-release catch at the floor level.

The lever arm is made up of two parallel steel rods by means of which a differential motion is obtained. One rod is rectangular in section and therefore stiff; it consequently exerts uniform leverage throughout the stroke and inserts the plunger of the main switch in the transformer primary circuit. This takes place before the welding pressure is applied by the second rod, which is depressed simultaneously, but exerts delayed leverage because its greater flexibility allows it to bend while being depressed.

### Some Advantages

The preliminary spot weld tacking of the overlapping seam prevents any "plucking" of the roller electrodes, while overheating and sticking of the rollers are avoided by the use of an interrupted current feed, so lengthening the life of the main electrodes. This is done by means of an interrupting switch with cheaply renewable tapping contacts of substantial dimensions.

The oscillating mechanism is metal clad in an oil bath to exclude copper dust, and belt-driven off the motor-gearing that actuates the main electrodes. Thus the frequency of current interruption is automatically varied in accordance with any change in welding speed.

**A novel Ferranti clock seen at the Art in Industry Exhibition**

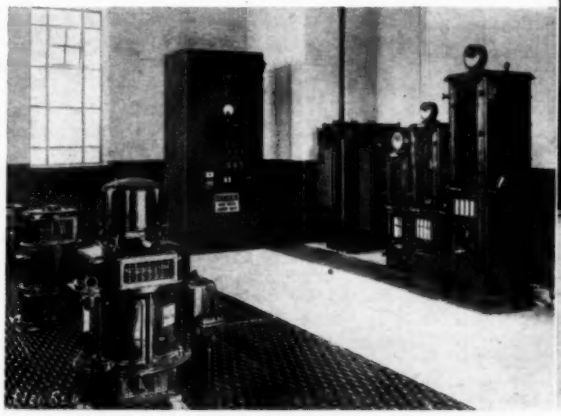
# Pumping Sewage Electrically. By P. J. Shipton & A. G. Shreeve

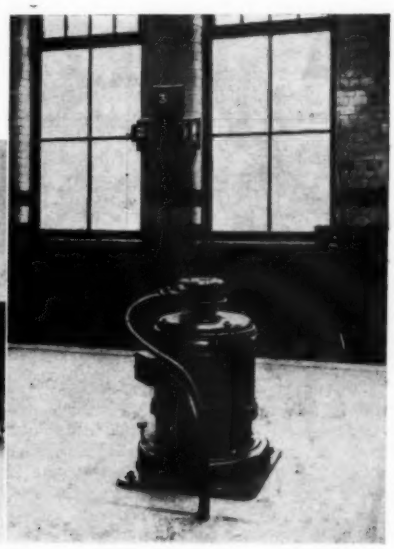
FOR sewage pumping the dry sump installation is favoured because the pumps are so arranged in a well that the feed pipe is filled by the sewage flow and suction need not be considered. This, as a general rule, is very desirable, as if the pump is not self-priming it is necessary to fit some form of ejector or air evacuation device whereby the pump can be filled with sewage up to its delivery valve.

The dry pumping chamber arrangement is recommended by the Ministry of Health. The tank containing the crude sewage, which is built on to the side of the pumping station, should have a sloping floor so that any solid matter will not tend to stick and accumulate and possibly cause trouble in the suction pipe. The centrifugal pumps are of the vertical type and are driven by vertical motors. In this way floor space is reduced to the minimum; also the motors themselves are well away from the pumps and tanks and all possible sources of moisture, which is detrimental to motor windings.

When arranged in the vertical manner the driving shafting between motor and pump may be of the open type with bearings carried on a steel framework, the number of bearings being arranged to suit the length of shafting required. The actual weight of shafting, pump impeller, &c., is taken by thrust bearings in the motor stool and separate lubrication is provided for each bearing. Alternatively, the shaft and bearings may be encased in a pipe and the bearings lubricated by separate pipes from the motor floor level. All bearings must be kept well packed with grease, and 140 deg. F. is the maximum temperature allowable for satisfactory running. The electrical control gear and float-operated tappet switches are arranged in a convenient position adjacent to the motors.

The underground pumping station illustrated is an arrangement which complies with the recommendation of the Ministry of Health. The pump and motor are horizontally mounted on the same bed plate, and are in a dry chamber. In a similar layout, but with the pump and motor mounted horizontally in a chamber above the level of the sewage, suction conditions have to be considered.





**Motors and control gear in a sewage pumping station, and (right) a vertical-type motor and float switches**

In some stations heating apparatus is installed to dry out any moisture, and a further point which requires attention is the desirability of building the complete station with a float characteristic.

Manufacturers have designed unchokable centrifugal pumps for dealing with sewage. The type in general use consists of a circular shaped casing with feed and delivery pipes. A set of revolving vanes or impellers inside the casing is arranged in such a way that solids can be passed through, the only limit to the size of solid which a pump can pass being the size of the passage through its impeller. For a pump of this type capable of passing 7¼ in. diameter solids, the delivery and suction pipes would be of approximately 8 in. diameter.

Pressure required to lift the sewage is obtained by the rotating impeller. This imparts to the liquid entering the pump an increased velocity, which is converted into pressure by a suitably arranged whirlpool chamber. The head obtainable is dependent on the velocity of the impeller, and the practical limit for a single stage pump is approximately 150 ft. head. Sewage pumps are nearly all of the single stage type, as generally the actual lift required is not excessive. By using an unchokable pump the screening of sewage to protect the pumps is not vital.

## Electric Drive

The pump is well suited for direct electric motor drive. Wound rotor type constant speed motors are usually installed for the larger pumps, while squirrel cage machines are used for the smaller sizes, the majority of pumping stations having an a.c. supply.

A further point in favour of centrifugal pumps being driven by electric motors is the fact that the speed of the pump impeller is such that the motor can drive direct on to the pump, no reduction gearing being required. There is very little possibility of overloading the motor with a well-designed centrifugal pump. Hence motors can be used the maximum ratings of which are close to those of the pumps. In this way the best power factor can be obtained for the motor, and both pump and motor will operate in an extremely efficient manner.

It may be as well to point out, however, that while efficient running is of importance, the factor which must never be overlooked when dealing with sewage is reliability. Nothing must fail or be shut down, and provision must always be made to ensure that a duplicate method is available to deal with any emergency which may occur. The supply, motors, pumps, tanks, control gear and equipment generally throughout a sewage disposal plant are arranged in duplicate.

Some authorities insist on spherical floats for use with sewage, as these have less tendency to jam than ordinary flat top floats, but as an alternative conical shaped tops are sometimes used. There should be guides, so that the floats do not swing about in the tank and damage themselves. The tank in which the float operates should be as large as possible in order that the number of starts per hour of the pump motor and control equipment can be kept down to the minimum.

Float switches are of the quick-make and quick-break type and their mechanism is usually arranged on the over-centre spring principle. This gives an idle movement to the operating lever, but ensures that once the switch contacts have started to move they will always complete their travel.

The motors are usually arranged for automatic control; the starting and stopping of the pump motors are carried out by float-operated switches, the floats being arranged in the incoming sewage tank, and the float switches operated by tappets on the rod or cable, as the case may be. The pumps and motors are fitted in duplicate, sometimes in triplicate. Should the sewage rise above a predetermined level when the first set is pumping, the second equipment will start up automatically. With some schemes both pumps would then work together until the lower level is reached in the tank; with others the second pump is of a larger capacity than the first one, and in this case the first pump is usually shut down when the second one comes into operation.

The control is also arranged so that if the first pumping equipment fails to start for any reason, the next equipment will start after a predetermined interval of time. It is also usual to have a small switch fitted for hand control. This is useful in the event of it being necessary to empty the tanks for cleaning, or when it is necessary to pump independently of the float switch position.

Contactor-type automatic control equipment mounted in sheet steel cases and arranged adjacent to the motors, affording complete protection with no-volt and overload releases, gives satisfaction.

In the case of alternating current direct-on star-delta or rotor resistance starting is adopted, while for d.c. ordinary resistance starting is used. The easy manner in which speed can be varied with d.c. motors is sometimes made use of when pumping sewage, by arranging a rheostat in the shunt field of the motor and operating this rheostat from float mechanism, so that a rise in level will increase the motor speed, thereby reducing the level.

To enable the duplicate gear to be used and so avoid all the wear and tear taking place on one equipment only, a change-over control switch is provided to work in conjunction with the control gear so that either pump and motor can be controlled from either float switch.

# The Purchase of Coal. By R. Wright

## Defects of the "as received" basis

THE purchase of coal on an "as received" basis was advocated in an article in the ELECTRICAL REVIEW some time ago. I might be inclined to favour this method were it not for the discrepancies that are likely to creep into the analysing and testing of coal. In the first place, it is almost certain that the majority of colliery owners would desire independent tests upon the fuel, the results of which would be checked by their own chemists. The undertaking itself should at the same time have a sample for testing so that comparative figures are obtained. This would necessitate a weekly sample of at least 30 lb., divided into three consignments of each class of fuel received. Admittedly this quantity of 30 lb. is not considerable, but a great deal of work might be entailed in procuring it, especially at a large power station where three or four grades of coal are used.

### Effective Sampling

To sample the coal properly small samples must be extracted at regular intervals from each wagon or grab, over the whole weekly period of unloading, and put into separate airtight bins so as to retain the free moisture.

By the end of six days each grade must be reduced to a 30-lb. sample which would necessitate handling by several men. The more the handling the greater the loss of free moisture, especially with washed fuel. Each bin retains part of the free moisture to the ultimate detriment of the undertaking. Even when the fuel is laid upon a floor for reducing purposes a portion of the moisture is left behind, and part also is evaporated, so that from the time sampling is started until the requisite quantity is boxed up for dispatch the free moisture content is being gradually reduced.

The sample prepared for dispatch is usually placed in a fairly dry tin, but when taken out for testing the free moisture retained by the tin is often neglected. Each tin should be dried and weighed prior to the sample being put in, and a note of this weight should be attached to the tin so that the receiver can weigh it and check down to this particular figure again. This loss is not so great with a dry slack.

Sampling is more than a semi-skilled job. A short time ago I complained that fuel delivered to the works was not up to standard, this standard being 25 per cent. washed duff and 75 per cent. washed pearls. Two colliery representatives examined the fuel during unloading and extracted a sample from the feeding drum of the coal elevating plant, while I obtained another sample from alternate elevator buckets. On sizing (dried), the sample taken by the colliery representatives was found to contain 84.5 per cent. above ½ in. mesh and 15.5 per cent. below ½ in. mesh, the second sample showing 64.4 per cent. above ½ in. mesh and 35.6 per cent. below ½ in. mesh. The latter figures were finally accepted as correct.

Another example of sampling that I once witnessed was in a fairly large power station, and was made by the chemist himself. While inspecting the boiler house I observed a man taking from each hopper a small shovelful of fuel, which he placed in a bucket. I was informed that this was the shift sample for obtaining the calorific value. The fuel was a rough slack from approximately one inch down, and the type of chute and hopper allowed segregation to take place, thus permitting the large pieces to run to the hopper sides. Consequently the sample taken from the centre of the hopper was lacking in a due proportion of large coal, and was of considerably lower calorific value.

### Varied Results of Tests

Again, if three samples are tested upon which calorific value has the price of fuel to be based? That the results will probably not be within close limits is illustrated in the table relating to three tests taken in conjunction with a boiler test which came under my personal observation. This test was carried out under the supervision of five specialist engineers. The taking of samples from each barrow load of fuel (the coal being fed into the hoppers by hand during the test) was supervised by two of these engineers, the final reduction and selection of the three samples being closely watched by all interested parties.

| | Test No. 1. | Test No. 2. | Test by Undertaking. |
|---|---|---|---|
| Percentage of free moisture ... ... ... | 10.78 | 6.73 | 11.63 |
| " of hygro. moisture ... ... | 2.08 | 8.77 | 0.95 |
| " volatile ... ... ... ... | 31.3 | 31.2 | 28.49 |
| " of fixed carbon ... ... ... | 46.93 | 47.31 | 53.59 |
| " of ash ... ... ... ... | 8.91 | 5.99 | 5.34 |
| Gross calorific value as dried, B.th.u. ... ... | 12,580 | 13,370 | 13,407 |
| " " " received, B.th.u. ... | 10,960 | 11,298 | 11,720 |
| Net I.C.E. value, B.th.u. ... ... ... | 10,430 | 10,719 | 11,192 |
| Percentage efficiency of boiler calculated on I.C.E. calorific value ... ... ... ... | 84.45 | 82.2 | 78.7 |

Tests Nos. 1 and 2 were taken at two independent coal-testing laboratories, while the third was taken by the undertaking, the calorific value being obtained with a bomb calorimeter. The highest total moisture is 23.25 per cent. more than the lowest. In ash the difference is nearly 66 per cent.; in the gross calorific value it is 6.6 per cent. and in the "as received" calorific value almost 7 per cent.

Assuming the lowest calorific value as the standard (neglecting the ash content which would make a further difference) and taking 14s. as the price per ton, the cost of fuel would be increased by £1,960 on a 40,000-ton consignment, to which must be added the increased labour cost for sampling and testing, the total quite easily reaching £3,000 or nearly £58 per week. This would appear to be unnecessary expenditure seeing that one sample of coal can produce such varied results in the hands of different test departments.

Although some undertakings purchase their fuel in this manner it is difficult to see how a colliery company can agree to accept the undertaking's figures as the basis of the cost per ton.

### High Grade Fuel

I do not agree with the view expressed by the author of the article that "the use of high grade fuels is an expensive luxury." This may be so with any one plant, but before a hard-and-fast ruling can be laid down the conditions governing the burning of the fuel must be considered. One type of grate may burn an inferior fuel more efficiently than it does a high grade fuel under existing running conditions, air leakages through the grate being reduced by the increased ash content of the lower grade coal. This is often lost sight of when testing various samples on a grate which is often too large for the class of fuel used, owing possibly to the customer desiring a grate capable of burning a moderate class of coal. Obviously such grates cannot economically deal with all grades of coal in an equally efficient manner.

Without strict supervision firemen are apt to neglect that constant vigilance which is so essential to the efficient operation of boiler plant. If high-grade fuel is being used a lower efficiency may result; this can be raised again if the fuel is replaced by one of lower grade and the same firing conditions are maintained.

By "high-grade" fuel I mean coal of high calorific value and low ash content. For comparative purposes we may regard the ash content of high-grade fuel as less than 6 per cent.; of medium grade as between 6 and 15 per cent.; and of low grade as above 15 per cent. Even then, the combustible and the B.th.u. per penny should also be considered as a preliminary. This is a good guide in selecting a fuel for test, as a fuel showing up best in this direction is not always economical to burn. Boiler tests should be run on the selected fuels as a final guide to purchase.

### Fuels Compared

The following five grades of fuel were selected from contract quotations to be tried under working conditions. Their comparative performance confirms that cheap coal is not always a paying proposition :—

| | Total moisture. %. | Ash. %. | Dried C.V. B.Th.u. | Price per ton. | Total combustible per ton lb. | Lb. per 1d. | B.th.U. per 1d. |
|---|---|---|---|---|---|---|---|
| | | | | s. d. | | | |
| 1. | 15.1 | 5.02 | 11,670 | 10 0 | 1789.3 | 14.91 | 184,911 |
| 2. | 5.8 | 19.20 | 11,240 | 11 8 | 1680.0 | 12.00 | 169,403 |
| 3. | 6.7 | 11.10 | 12,780 | 12 0 | 1841.3 | 12.79 | 185,487 |
| 4. | 6.4 | 11.87 | 12,950 | 12 6 | 1830.8 | 12.20 | 181,006 |
| 5. | 14.1 | 7.28 | 13,100 | 14 0 | 1761.0 | 10.49 | 150,042 |

It seems that No. 3 sample is the cheapest fuel, being first in B.th.u. per penny as well as combustible per ton. Let us, however, consider the behaviour of each under working conditions.

No. 1 fuel is a washed duff and requires at least 40 per cent. more handling owing to its poor running quality in the elevating plant and from the bunkers to the boilers. The extra cost of unloading is 1s. 3½d. per ton, making a total of 11s. 3½d. If such a coal were used exclusively the coal handling plant could not cope with the demand during normal working hours, which would necessitate an extra shift of coal attendants, together with two additional men on each shift to keep it running into the boiler chutes. By the time it is burnt the total cost of No. 1 will probably equal the value of No. 5.

No. 2 fuel is a rough slack from ½ in. downwards with 40 per cent. below ½ in. In wet weather handling is almost as difficult as with No. 1, and this increases the handling charges. Its ash content is 14 per cent. more than that of

No. 1 which, with 40,000 tons of coal per annum, makes a weekly increase of at least 109 tons; in other words, practically four times the ash has to be handled with No. 2 if No. 1 is assumed as a basis.

No. 3 fuel has an ash fusion point of 1,100 degrees C., allowing the ash to fuse with the brickwork, thus reducing the life of side walls and arches. Clinker forms on the base of side walls causing the fire to be "raked" from the grate at each side with consequent loss of efficiency due to excess air. In addition to this the slicing of the side walls which becomes necessary adds to the destruction of the brickwork.

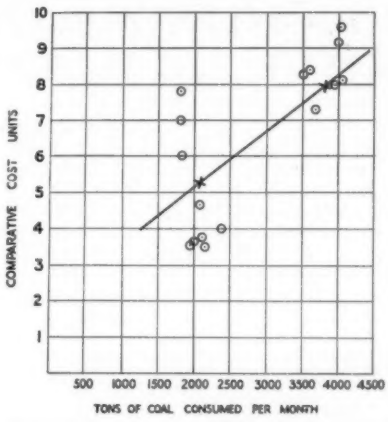
No. 4 fuel is a coking coal which cannot be burnt off properly owing to the fire burning in patches. This results in a large rejected carbon loss and low percentage $CO_2$.

No. 5 fuel is a quick burning fuel giving the utmost flexibility to the boilers; its ash has a high fusion point which reduces brickwork repairs to a minimum.

Of the five classes of coal only No. 5 is satisfactory from an all-round standpoint.

### Ash Content

The greater the proportion of ash in a fuel the larger the handling and repair costs must be. If the yearly consumption of 40,000 tons is again assumed, and the ash content is increased from 11 to 18 per cent., then an extra 2,800 tons of ash per annum must be handled, which is almost 54 tons per week. If ash handling costs do not increase then the ash handling organisation previously in vogue was inefficient.




**Comparative ash-handling and repair costs. The crosses indicate the average for each nine-monthly period**

The graph reproduced indicates the increase in ash handling and repair charges over a period of eighteen months, the consumption of coal over half of this time being almost doubled. When consuming 2,000 tons of coal per month the cost is equivalent to a comparative unit of little over "5," and when the consumption reaches almost 4,000 tons per month the cost goes up to almost "8"; as the same class of fuel is being used over the whole period the amount of ash is doubled.

# Moving-coil Ammeters. By G. W. Stubbings, B.Sc., A.M.I.E.E.

## Voltage adjustment in testing circuits

MOVING-COIL ammeters which are intended for the measurement of all but minute currents are invariably of the shunted type, and are designed to give full-scale deflection with a standard value of the millivolts on the terminals of their connecting leads. This standard millivolt value is 50 or 75 for the majority of instruments, but when ammeters are connected to d.c. meter shunts, the millivolts for full scale deflection may have values of 125 or 250.

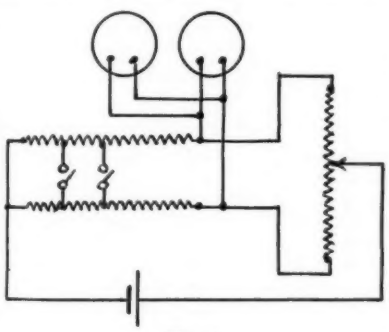


**Fig. 1**

A convenient method of testing d.c. ammeters on site is to disconnect the instrument leads from the associated shunt, and to apply to the ends of these leads voltages corresponding to the various points on the scale which it is desired to check, the values of these voltages being indicated by a sub-standard instrument connected in parallel with the one under test. The practical difficulty of this method lies in the adjustment of the low voltages required for the test. Since the value of the currents required to deflect the test and the sub-standard instruments to full scale are very small, a dry cell giving a nominal terminal voltage of 1.5 is a very suitable source of test current.

The regulation of the voltages on the instruments can be made in several ways. The most straightforward is to use an adjustable series resistance, but in order to check the instrument under test between full scale reading and one-tenth of this value, the resistance must be capable of variation so that the current drawn from the cell can be adjusted between the values of, say, 30 and 3 mA. The series resistance must thus be capable of variation between 50 and 500 ohms. If the controlling circuit be of the potentiometer type, then the potentiometer resistance must not drop more than one-twentieth of the voltage of the cell, and unless a considerable current is drawn from the cell, the regulation of the voltage on the two instruments will tend to be coarse near the maximum value.

### A More Convenient Method

A somewhat more convenient method of adjusting the voltage for testing d.c. ammeters is to connect the test and the sub-standard instruments in a Wheatstone-bridge network, and to obtain the voltage variations by putting the bridge out of balance.

The resistance network (see fig. 1) is composed of two fixed units of equal ohmic value and an adjustable resistance the total value of which is equal to twice that of the fixed units. When the bridge is in balance, all four arms are thus of equal ohmic value. The bridge can be put out of balance by moving the sliding contact on the adjustable resistance, and the polarity of the voltage on the instruments will depend upon which side of the neutral position the sliding contact assumes. The arrangement can thus be used for checking centre zero instruments.

If the values of the four equal arms of the bridge be called $r$, and the combined resistance of the two instruments in parallel R, then if the sliding contact be moved from the neutral position by an amount corresponding to a fraction n of the resistance $r$, the voltage on the instruments, per volt applied to the bridge network, can be easily shown to be

$$V=\frac{2nR}{4(R+r)-n^2(R+2r)}$$

The values of the instrument millivolts corresponding to various values of n are shown in fig. 2, which has been drawn for a value of $r$ equal to 40 ohms and a combined resistance of the two instruments equal to 2.5 ohms. The regulation from the zero to the maximum value of the pressure on the instruments is seen to be very fair.

### Alteration of Pressure

The range of pressures given by adjustment of the variable resistance in the network can be altered by reducing the values of the fixed units. If the resistances are made up as a portable testing unit, this reduction can conveniently be made by means of switches or plugs, arranged, as shown in fig. 1, to short-circuit equal parts of the two equal arms. If the values of these equal arms is halved, the maximum pressure available on the instruments is approximately doubled, but the regulation is impaired, the adjustment becoming coarser at the upper part of the range.

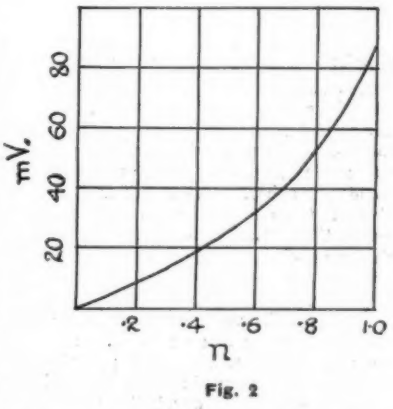



**Fig. 2**

If there is no need for a centre-zero arrangement of the adjustable resistance, the bridge can be made up with three fixed units of equal ohmic value together with an adjustable unit having a value, say, one-tenth greater than the fixed units. The neutral point of the adjustable resistance will then be near one end, and the small remaining portion will be useful for verifying that the instrument under test will deflect a short distance in the reverse distance.

# MEETINGS AND DISCUSSIONS

## Current Topics and Opinions Expressed at the Institutions

### Synchronous Time Motors

SMALL synchronous self-starting motors (excluding those requiring hand or external starting means) such as are employed in time switches, meters, recording instruments, and other timing devices, are dealt with in the paper by Messrs. W. Holmes and E. Grundy which was read before the Meter and Instrument Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on March 1st.

The authors divide these machines into three primary classes according to the manner in which the synchronous tendency is

**Messrs. E. Grundy and W. Holmes, the authors of the accompanying paper. Mr. Holmes is manager of Messrs. Ferranti's instrument department and Mr. Grundy is his assistant**

obtained by means of a rotor system of (1) permanent magnet material actually magnetised to a high degree of intensity by external means before being applied to the motor; (2) permanent magnet material deriving its magnetisation from the effect produced by the stator system; and (3) soft iron or magnetic material.

Each of these may be sub-divided into two groups with the rotor element (i) acting as, and comprising, both starting and synchronous components with only one rotor solidly coupled to its shaft; and (ii) in two parts, one for starting and the other for synchronising, either spring- or friction-coupled, and generally operating in separate fields.

The paper contains a résumé of some designs available and general test results obtained, followed by detailed data on the hysteresis type of motor recently investigated by Messrs. Ferranti, Ltd. From the results obtained the authors endeavour to substantiate the theory of this type of machine as expounded by Steinmetz in 1900. Various new materials, such as cobalt steel, aluminium-nickel steel, and magnetic silver alloys, are considered. The hysteresis coefficients of the first two mentioned were determined experimentally and are given.

The nine designs of motor described were chosen as typical of those available, while pitfalls encountered in design and difficulties experienced in manufacture are explained. They include impulse starters, high- and low-speed induction starters, and the high- and low-speed hysteresis types.

The newest type is a low-speed hysteresis machine related to Steinmetz's theory, which has given promising results though single and double rotor investigations have not yet been completed. With a single cobalt-steel rotor of 5.6 gm. mass, directional in rotation, the overall size is 1¼ in. in diameter by 1 in. deep. With the results already obtained it is felt that a step forward has been made.

At 230 V, 50 cycles, 375 r.p.m. the wattage is 1.8 and the $I^2R$ value is 0.64. The starting torque is 2.5, the synchronous torque is 5.4, and the running-in torque is 2.3 gm.-cm. The work done is 5,400 gm.-cm. per minute, the b.h.p.$\times 10^5$ value being 1.19 and the efficiency 0.49 per cent.

The subject of running-in torque, which is a very important factor, has been thoroughly investigated and test methods used in the laboratory for measuring the various torques are explained. The starting characteristics have been measured with the aid of a high-speed camera.

The use of permanent magnets as synchronous-motor rotors has been studied from theoretical and practical points of view, while the requirements of the motor bearings are stated and typical examples are given.

### Private Plants and Public Supply Tariffs

THE paper on this subject by Mr. J. A. Sumner (whose main conclusions were summarised in our last issue) was discussed at the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 28th.

Mr. E. F. Hetherington said that the author and himself were closely associated in a Midland area and he was glad of the opportunity to testify to the author's work. With the first portion of the paper, dealing with private plant, he was in full agreement; it was time the subject was properly investigated. Many industrialists had but the merest idea of what their private plant was costing them. They had succeeded in changing over 85 per cent. of the private plant in his area. He could not agree that the price of electricity should be competitive only, for cheap power was beneficial to all concerned.

Regarding the second portion of the paper, the West Midlands J.E.A. development had been on conventional lines, but very accurate costing had provided the means of ascertaining how the scheme was working out. The author had not proved his point for national co-ordination of tariffs. There was need for co-ordination, but that would not be the national solution. In the method of charging there was need of agreement, but he could not subscribe to a national tariff on a flat-rate basis. Even if the capital charges were similar in rural and urban areas, there was a lower revenue from country districts, so that rural electrification was a difficult financial proposition.

#### The Helpful Power Load

Mr. R. A. Thwaites said that he had been concerned with the development of an area with a population of one person per acre, but there was a fair potential power load, about half of which had been obtained, and it had shown how helpful a power load was in developing a rural district. The dilemma was whether the whole of an area should be developed and a relatively high price quoted, or only some 60 per cent. of the whole area, which would enable cheap energy to be offered for domestic uses in the rural portions. Electricity should be sold at an economic price; one should not try to obtain all that the market would stand. Diversity varied with load factor, and the fixed and running charges might be corrected accordingly.

Mr. A. C. Sparks, at first sight, saw little to quarrel with in the paper. But if the author limited his consideration to private plant of 500-kW capacity then the paper assumed a different character. If it was suggested that the life of private turbine plant was longer than generally reckoned then the cost must come down. He was surprised that it apparently had been found cheaper to use single line 132-kV towers rather than 33-kV design, and could not agree that it was necessary always to place the earth wire along the tops of the poles. Similarity of rural and urban tariffs could be brought about if the urban districts subsidised the rural portions. Regarding the suggestion that supply costs would increase in future, he would rather say "vary" than "increase," but only a bold man would maintain that supply costs would fall.

Mr. D. J. Bolton said that the author's table of loan charges and method of deriving tariffs for a detailed public supply scheme had no connection with the tariffs he dealt with, and several of the figures in that table were difficult to understand. Since the l.v. supplies operated through the h.v. system the differing diversities assigned by the author, which would affect the final cost, were not easily understood. The author seemed to lack faith in the fundamental method of the two-part tariff. If costs and tariffs were two different kettles of fish, then one should be scientific with costs and politic about tariffs, but not mix the two things.

#### Knowledge of Costs

Mr. A. F. Webber thought that the reference to the pass-out turbine was an individual instance that might have been omitted. Electricity had far more formidable competitors than that one and the figures were insufficient to disclose anything. However, he agreed that the power and heating loads were often assumed to agree more closely than they usually did. Mr. W. A. Crocker maintained that the statement that consumers did not know what their costs were, or were likely to be, was not correct in cases of private plant above 500-kW in capacity. In the past the trouble had been that the public supply negotiators had not known as much about costs as private plant users did.

Mr. F. Jackson commented on the great variety of tariffs quoted to-day. His concern purchased from fifty different

companies, each of which had six different tariffs. Some serious effort must be attempted to straighten out that state of affairs.

Mr. J. A. Sumner, in reply, stated that the cost of running small Diesel-electric plant might seem high, but the figures were not his. They had been published by a Diesel engine maker and they were the fairest he had seen, since they took account of the load factor, which was a courageous thing for the engine maker to do. His Table 7 was not intended to be an example of costing, but merely to clarify the two-part tariff. If costing were done properly one might obtain a three-part or even a ten-part tariff. That was one of the dangers of the method. A too-scientific tariff was all right in its place, but one did not go far before becoming arbitrary.

He did not know why a suggested national tariff should cause excitement. He had not suggested one charge for the whole country, but that unification was necessary as at least 2,000 different prices were being quoted to-day. There was nothing violent in the suggested merging of undertakings, for that had been, and was being, done quite often. He did not favour a fixed price, but they might consider a minimum below which electricity should not be sold. Present methods were based on trying to obtain as much as possible in each individual case.

Accurate measurement had shown that the diversity of the h.v. system could be greater than that of the l.v. network if the former were more highly developed than the latter. To say that he had made sweeping generalisations was in itself a sweeping generalisation. He was of the opinion that public supply costs would decrease during the next eight to ten years.

## Sign Lamp Characteristics

A PAPER on "The Time Characteristics of Tungsten Filament Lamps for Signs, Signals and Beacons" was presented by Messrs. J. M. Sandford and J. M. Waldram at the February meeting of the Illuminating Engineering Society in London. The authors pointed out that in special illuminating equipment, such as signals and beacons, where it was necessary to produce a flashing indication by interrupting the lamp circuit, data was required on the time characteristics of the lamps used. Experiments were conducted with fifteen lamps covering as evenly as possible the limits of current rating 0-50 A, and curves were obtained to show the empirical relation of incandescence and nigrescence times and current rating, and the effects of rapid switching and external resistance were considered.

The authors explained that the most straightforward application of the data obtained was to electric signs, in the design of which the speed of nigrescence of lamps used was often very important, particularly in signs simulating rapid motion. In some types a high speed of nigrescence was desirable, and in some a lower speed. For instance, a sign intended to represent a slow, gentle movement, such as curling smoke, required quite long incandescence and nigrescence periods if a jerky effect was to be avoided. On the other hand, "drifting" news signs, in which a series of letters was caused to drift across the face of a bank of lamps, required a very high speed of nigrescence, otherwise the letters would appear to leave a trail behind them.

The latest drifting signs made use of small electric discharge tubes instead of filament lamps, so that the period of incandescence and nigrescence was practically nil, and a very sharp and clear indication could be given at any speed. Communication by light signals varied from the transmission of fairly long messages to the broadcasting of one or two letters or numerals which conveyed an order or information according to a recognised code. The intensity distribution of the signal might vary from a very narrow angle beam to a signal extending over the complete hemisphere, depending on the service which it was required to give.

The intensity distribution of the beam of light determined the characteristics of the lamp. The greater the solid angle of the beam, the more flux would be required for a given range, and the greater would be the power of the lamp necessary. The smaller the solid angle of the beam, the smaller must be the filament of the lamp, and consequently the less the filament voltage, and for a given flux output, the greater the current.

Narrow-beam long-range signal projectors suitable for high speed signalling could not, therefore, be operated by keying the lamp circuit, and, in effect, for a given beam divergence the signalling speed set a limit on the range. Wide-angle signal projectors could usually be designed for larger filaments and in consequence it was possible to use high-voltage lamps of low current or with several low-current filaments in parallel.

## Will the Grid Expenditure be Justified?

THIS subject was discussed at an informal meeting of the Institute of Fuel on March 1st. There was an attendance of over 200, which included representatives of the electrical, gas, coal and oil industries. The debate was opened by Mr. Harold Hobson, general manager of the Central Electricity Board, and Mr. W. A. Tookey led for the other side. The chairman was Sir Alexander Walker, K.B.E.

Mr. Hobson said that in 1926 42 per cent. of the aggregate plant installed in 482 generating stations was held in reserve and by 1931 the proportion had increased to 45 per cent. In 1925-6 the average coal consumption per kWh generated was 2.4 lb. Under full grid operation the proportion of spare plant would be reduced to at most 15 per cent., while the interconnection of power stations would enable the fullest use to be made of the more efficient stations.

The Central Board had been trading only in two areas since the beginning of 1933; in four areas since the beginning of 1934; the South-West England area came into operation on January 1st, 1935; while in the North-East England and South Scotland areas trading had not yet commenced. Whereas in 1926 the average size of generating sets was less than 10,000 kW, the average size ordered last year was nearly 40,000 kW. There were also savings in labour and other costs due to the most economical disposition of the load.

In 1933 the total plant installed in public generating stations in this country was 7.7 million kW, and if the spare capacity was reduced to only 25 per cent., this at once released 1¼ million kW of plant for revenue earning, valued at £18,000,000. The absorption of spare plant had been going on before grid trading started due to temporary arrangements for giving supplies over sections of the grid, and by the end of 1935 half the possible saving in this respect would be made.

By the end of 1944 the plant installed would be about 8.5 million kW, representing a saving of £34,000,000 over the ten years.

In 1924, the coal consumption averaged 2½ lb. per kWh, and in 1932 (the year before the normal trading of the Board began) this had fallen to 1¾ lb.; taking a line through that for the period to 1944, a reasonable estimate would be 1.3 lb. without the grid. In the selected stations operating between 1932 and 1934, there had been a reduction of 7¼ per cent. in the average coal consumption. In 1932 the average coal consumption at these stations in the five districts mentioned was 6¼ per cent. below the average of all the stations in the country and thus the concentration of the whole output in the selected stations in 1934 would have resulted in a reduction of 12¼ per cent. In 1934, however, the selected stations dealt with only 95 per cent. of the load, but assuming only 12¼ per cent. reduction they could expect by 1944 an average coal consumption of 1.1 lb. per kWh generated instead of the 1.3 lb., the difference representing £12,000,000 over the ten years.

These savings alone represented £46,000,000 for the next ten years. Taking the cost of the grid at £30,000 per annum (to allow for expansion) and 11¼ per cent. to cover interest, depreciation and administration, then for the ten-year period this would represent the sum of £34¼ millions, leaving a direct and net saving of something over £11 millions. That estimate was based on the conservative assumption that the increase in load during the next ten years would be not more than had been taking place recently.

Already there had been a capital saving of at least £9 millions, and the selected stations had shown a reduction of over 7 per cent. in fuel consumption in two years, which indicated savings of £750,000 in coal for these two years' partial operation.

**Experimental floodlighting of Westminster Abbey for the Jubilee celebrations**

Mr. W. A. Tookey traced the growth of the electricity supply from 1920-21, and credited the work of the Electricity Commissioners with a large proportion of the great reduction in the cost of electricity to consumers.

He said that taking the period from 1920-21 to 1930-31, for the first five years the annual capital expenditure was £19 million and during the second five years £28.3 million. The distribution costs during the first five years were 0.179d. per kWh, and fell by only 0.01d. per kWh. Management cost was 0.1745d. per kWh in 1920-21; during the next five years this had been reduced by 20 per cent. to 0.1403d., but in 1931-32 the money cost had increased by 240 per cent., which brought about a reduction per kW of only 0.001d. during the previous five years.

There was a 24 per cent. increase in total working expenses at the end of the first five years and 134 per cent. by the end of the second five years, the cost per kWh falling from 1.757d. to 0.776d. The considerable reduction in total working expenses was due to the price of coal having fallen from 35s. to 15s. per ton in the ten years.

Mr. Tookey touched upon the possibilities of the grid proving vulnerable through strikes and other causes, and mentioned the difficulty of bringing costs down appreciably when the datum line had already been nearly reached. During the past ten years the average lighting charge had fallen from 5.75d. to 2.54d. per kWh, the power charge from 1.69d. to 0.79d., and the traction charge to 0.73d., and he doubted whether, having regard to what was taking place before the grid came into use, the expenditure upon it would be fully justified.

During the subsequent discussion criticism was levelled at the high rates of interest which the C.E.B. was paying on some long-dated loans in comparison with the present market rate.

It was also suggested that undertakings had paid too little for their coal in the past and that an increase in the price was likely in the future. A chart was shown by one speaker indicating that between 1931 and 1934 about 2,000,000 kW of generating plant had been saved through the interconnection of the selected stations; at £14 per kW, this meant £28,000,000.

Mr. Hobson in his reply said that not very long ago the whole of the supply in Glasgow and Ayrshire would have failed over a considerable period but for the grid which was able to save the situation.

## Crystal Radio Oscillators

THE paper on this subject by Messrs. C. F. Booth and E. J. C. Dixon which was read before the Wireless Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on March 6th is an account of work carried out by the Radio Section of the Post Office between 1925 and 1934 in the development of the use of quartz crystal oscillators in a number of different applications, of which the most important was the control of the carrier frequency of short-wave transmitters used for overseas radio services.

The paper is divided into an introduction and five parts treating respectively of the crystal plate (including tourmaline and special applications involving the use of the crystal plate as a resonator), the crystal holder, the oscillation circuit, the temperature control of the crystal, and results obtained in service. The importance of apparatus capable of precise frequency measurement, both in the development work and in the maintenance of a high grade of service from the constant-frequency point of view, is emphasised.

Post Office transmitting stations are measured as nearly as possible daily and the operators are informed if the mean carrier frequency is outside the Convention tolerance of $\pm 200$ parts in $10^6$. The author's figures show tolerances corresponding to ten parts in $10^6$ in the case of short-period records and $\pm 100$ parts in $10^6$ in the case of long-period records obtained with the measuring equipment at the Dollis Hill Laboratory and are accurate to within $\pm 1$ part in $10^6$.

With a " Y "-cut plate in a small oven with a helix bimetallic thermostat controlling a relatively powerful heater, the oscillator circuit is not in the oven and reactive coupling accessible to the operator is provided, and from day to day the mean frequency may vary 30 parts in $10^6$. With an " X "-cut plate in an oven designed to hold two complete oscillators a helix bimetallic thermostat is used and the heater is associated with it in a similar manner to that of the previous example. On three days the variation of the mean was only five parts in $10^6$ and on the fourth day ten parts in $10^6$.

The performance of a transmitter using the selenium-resistance thermostat shows a mean frequency somewhat above allocation and the general performance otherwise is no better, which demonstrates that the performance is governed by the thermal characteristics of the oven rather than by the sensitivity of the thermostat device, since the oven sizes are the same in the two cases whereas the sensitivity in the second case is very much greater than in the first.

## Electric Welding in Shipbuilding

SPEAKING at the annual meeting in Glasgow on February 27th of the BRITISH CORPORATION REGISTER OF SHIPPING AND AIRCRAFT, Mr. Maurice R. Denny, chairman of the technical and aviation committees, referred to electric welding in shipbuilding. Apart altogether from mere spectacular " all-welded " ships, he said, there had been a remarkable expansion in the use of electric welding at home and abroad—especially abroad. On the Continent electric welding was to be found in nearly every ship that was being built, and in some yards it was becoming usual to apply electric welding to practically everything but the shell.

Proof of increasing use and constant search for improved technique was given by the frequency of application for approval of new types of electrode, and most of those came from south of the Border. One was inclined to wonder if the Clyde and the West of Scotland were not lagging a little in this particular race. They should surely aim at first place in developments so intimately associated with shipbuilding.

One could not help noticing the extent to which electricity was being applied to operations aboard ship, from cooking, through auxiliaries, to main propelling plant. Britain had possibly moved more slowly than other nations in the application and use of electrical energy ashore and afloat, but there was now such strong evidence of expansion in every direction that it was beginning to look like the closing stages of a great steam era and the opening of an electrical era in which steam would be a subsidiary, a philosophical digression prompted by the matter-of-fact way in which such things as electric steering gears, direction finders, &c., were making their appearance in ships, where the first law was that everything must be simple, efficient, economical, and foolproof.

### Unforeseen Developments

Mr. G. J. Innes, vice-chairman of the Corporation, who presided, made a passing reference to the innumerable technical developments which were taking place and emphasised how blind people were as to what the future had in store for them. Those responsible for the development of welding technique could scarcely have guessed that the welding of appendages to the afterposts of vessels would, at trifling cost, increase the capacity of the cargo carrying tonnage of the world by a vast amount; and he doubted if the influence of artificial ventilation upon the design of passenger accommodation could have been realised in the beginning.

Mr. R. E. Kellam gave several examples illustrating the reliability of electric propulsion, and Mr. Robert Marshall spoke of West of Scotland developments in the steel industry.

* * *

### Testing Radio Receivers

At the second informal meeting of the Wireless Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 26th, a discussion on the production testing of broadcast radio receivers was opened by Mr. F. Murphy, who pointed out that such tests were divided into three separate categories. Their objects were to ascertain the (i) correct value of the physical constants of the component parts, (ii) the constancy of those quantities with time, and (iii) the total life or overload capacity of the components. He stated that all such tests as involved the personal element to some degree were subject to two possible errors, namely, (*a*) amoral, *i.e.*, inability to operate or read the testing gear, and (*b*) moral, *i.e.*, inability to reject the faulty part revealed. Lantern slides illustrated typical tests carried out in a modern broadcast receiver factory, while Mr. W. B. Bartley replied to the discussion. The meeting was attended by 490 members and visitors.

### The I.E.E. Faraday Lecture

" Electricity in the Life of To-day " is the subject of the Faraday Lecture which is being delivered by Professor E. W. Marchant at the provincial Centres of the INSTITUTION OF ELECTRICAL ENGINEERS. At the South Midland Centre on February 28th Prof. Marchant said that the capital at present invested in electricity supply undertakings was over £450,000,000. The electrical industry was the fifth largest in the country. The telegraph could now send ten messages along a cable to any part of the world in the same time as it took to send one message when the first Atlantic cable was laid. When Swan produced the first incandescent carbon lamp in 1879 he obtained an efficiency of about three lumens per watt. In the new discharge lamps the figure was over twenty-five. Electricity had done more than any other single agent to reduce domestic drudgery. During the last ten years the average efficiency of electric power stations had improved by over 50 per cent. The use of electricity for domestic heating would do more to free cities of smoke than anything else.

# Correspondence

*Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession*

## Supply Undertakings' Contracts

The Electricity Commission has sent out a letter in which it expresses the view that, in obtaining tenders, supply undertakings should not specify that plant or materials should be the products of a particular firm or group of manufacturers. Apparently this would prohibit the specifying of C.M.A. cable for wiring contracts or E.L.M.A. lamps. In many cases stations have certain switchgear already in operation and it is necessary when the switchboards are extended to specify the same makers' gear in order that it may fit the switchboard.

Many municipalities have a standing order that contracts over a certain value must be advertised. In these circumstances if a 30,000-V switchboard is to be extended the Department must issue a full specification and ask for tenders from manufacturers at home and abroad for apparatus which obviously can be supplied by only one firm.

Surely the whole arrangement is becoming top-heavy and it will become increasingly difficult to run an undertaking on business lines if it is to be tied up with red tape to this extent.

*February 27th.* BUSINESS MAN.

## Fan Brakes for Motor Testing

It is being suggested in certain quarters that fan brakes are superior to other types for testing electric motors. It is claimed that a normal load test is inadequate in respect of fan and pump motors, in that it gives no satisfactory indication of ability to accelerate such loads.

A great deal depends on the meaning of the word "normal." In our opinion a normal test is one which produces evidence, in terms of suitable units, that a motor is capable of the duty for which it is sold, involving a recognised value of starting torque in respect of acceleration. To this end normal test routine should include direct measurement of the torque against which a motor will actually run up to speed, a value which cannot be derived with certainty from the usual instrument readings.

In what respect does the fan brake meet this requirement, and in what respect does it provide an adequate test substitute for a pump or fan load? Being mounted on the motor shaft it adds practically nothing to the static friction against which the motor has to start. It cannot possibly cover wide variations of static friction ranging from low speed fans and pumps with plain bearings and glands to the smaller types with light impellors mounted direct on the motor shaft. The fan brake imposes no load, worthy of mention, below half speed. This, in conjunction with its general lack of friction loss, makes it incapable of showing up any but the most aggravated tendency to crawl, a fault which would immediately be disclosed by measuring the running-up torque as a matter of routine. In our opinion it is not justifiable in the face of wide variations of fan and pump design to assume that a fan brake satisfactorily reproduces working conditions.

It is, we must admit, a very convenient and inexpensive piece of apparatus and no doubt lends itself admirably to the simplification of test routine. As a substitute for anything which appeals to us as a normal test it certainly leaves a lot to be desired. It is inherently incapable of giving any satisfactory quantitative measurement of starting characteristics. Fan testing must be, in our opinion, inferior rather than superior to direct measurement as an indication of starting performance.

BULL MOTORS.
F. H. JOHNSON,
*Director.*

Ipswich, *March 4th.*

## Another Skilled Man's Plaint

I have just returned from Canada, and after I had resided there for many years the powers that be decided that every electrical man must pass an examination and hold a licence to testify to his ability under three classes: (a) all classes of work h.v. and l.v.; (b) all classes of l.v. work; and (c) maintenance only.

Upon my return to England I find that work on some neon installations is being carried out by men who have practically no h.v. experience and precious little knowledge of the fundamental principles of l.v. wiring.

Last week I was offered the job of clearing up a mess that some one had started. The owner of a shop in the West End had several rooms over his shop and decided to convert them into two flats; so he got a so-called electrician to make the change in wiring, &c. After some weeks the owner could not locate this man, and so I was called in to carry on. I found the work had been done in c.t.s. and lead-covered cables and slip tube, as well as some screwed conduit. When I tried to show the owner what a hopeless task it was to do justice to him and carry out the small job well, you can imagine the result.

Why is it that we do not or cannot adopt the Canadian and American method of having all accessories passed by a national authority, and, more important still, wiremen, &c., certified as to qualifications, &c.? At present anyone having the price of a cheap pair of pliers, a screwdriver, and a knife can blossom forth as an electrician and from then on become a curse to every electrical man, whether he be an employer or a humble knight of the juice, such as myself. I have had twenty years' experience since my apprenticeship and I have held a Class A certificate in the Dominion of Canada since 1924. Yet I find that to-day it's the botcher that is "sitting pretty" and I am the man without a job. HARRY ROSE.

London, W.2, *March 4th.*

## An Electrical Mascot

I think that your readers may perhaps be interested in the accompanying sketch. It is a little figure which has been created in Wolverhampton and I think appropriately named by one of the staff.

"Eunice the Unit"

We use the figure in all our advertisements and, of course, it can be applied to any method of advertising electricity, particularly for domestic purposes. I do not know whether you may consider it a suitable competitor to "Mr. Therm."

T. A. G. MARGARY,
*Electrical Engineer and Manager.*

Wolverhampton, *March 1st.*

## Pensions and Compensation

I have read with deep interest the article by Mr. Thomas in your March 1st issue. In my opinion the only hope of a fair and equitable scheme of pensions is a State scheme. If the matter is left to the spasmodic efforts of a few well-intentioned firms there will always be a very large majority without pensions, who are unfortunate enough to be employed by firms, some of whom cannot afford to make any contributions towards this end, and others who will not attempt to do so. Its effect on the unemployment evil is ample justification for the Government to give it careful consideration, certainly before any reduction in working hours.

Briefly put, the following is what I have in mind. A State scheme with, say, ten different schedules to which, of course, all would contribute, according to salary or schedule, to embrace *all*, including State and municipal employés. The No. 1 or top schedule would include those in the highest positions, and pensions would be sufficient for them to live on in retirement according to the positions which they have held. No one in receipt of a pension should be employed, except in the case of a national emergency.

This scheme would effect a large saving in unemployment benefit, public assistance and poor law establishments, and would go a very long way to cover the additional cost to the State. It would also afford that sense of security which matters so much to the individual past middle age, and do away with the present unfair and inequitable position of a large portion of the community having to assist in paying pensions to others, with no hope of receiving anything of the kind themselves. Last, but most important of all, it would bring a great number of our young people back to employment, with renewed health, hope and happiness, instead of want, despair and demoralisation.

Broadstairs, *March 1st.* W. E. NICHOLSON.

The article by Mr. J. W. Thomas on "Pensions and Compensation," and the leader in your issue of March 1st, indicate the need for recognition of the fact that the electrical industry as a whole requires a political organisation, not upon the basis of party but economics. In the past twenty years the national wealth has been tremendously increased by the electrical industry, and a very small proportion of this increased wealth would cover the cost of pensions and compensation to those who have taken their part in creating it. If the Government were approached the obvious reply would be: "The nation cannot afford the cost." A politically organised electrical industry would deal with the matter by controlling inventions, developments and the like which lead to future wealth creation in such a way that the equities would be safeguarded.

The future development of the electrical industry depends directly upon the total population of the country having the means to purchase electricity: that means employment for the young and pensions for the retired. An impoverished population could not pay taxes for a "free" electricity supply, therefore the electrical industry has a particular concern with questions of national development and relative economic questions concerning purchasing power amongst the potential electricity consuming population.

One method of preventing rapid displacement of labour would be an organised control of new inventions which would involve provision for pensions, and labour displaced by machinery would be directed to other activities which would not result in a reduction in their electricity consuming capacity. The total load would therefore tend to constantly increase in spite of machinery. It might be possible to finally devise an alternative to gold as a currency basis, for example, the national electrical load factor which is not affected by hysterical Continental Bourses. A. G. Bullen.

Liverpool, *March 4th.*

### The Cost of Appliances

I suggest that Mr. D. Mills would be disappointed with the results of the Press and poster campaign which he urges, because of one important factor—the price of electrical appliances.

The real benefits of electricity in the home can never come within the reach of the vast majority of people, because they cannot afford to pay the ridiculously high prices charged for very necessary household appliances, like washing machines and vacuum cleaners. These are usually mass manufactured products, and as such, must cost a good deal less than half the price at which they are offered to the public. This is true, more or less, of most of the other appliances one sees advertised and displayed in showrooms.

I was recently privileged to hear Miss Haslett discourse on the vast expansion possible, owing to the potential domestic load, and the very real benefits which electricity would bring into the working-class home, but I fail to see how that will be possible while electrical appliances are beyond the reach of working-class and most other incomes. H. V. Pugh.

Bridgend, Glam., *March 4th.*

### Water-boiling Methods

As the representative of two electricity supply companies I have been astonished to find how many consumers use hotplates for boiling water.

The article in the Electrical Review of March 1st by Mr. F. D. Parker regarding apparatus for domestic cooking leads me to believe that the salesmen are neglecting their duty of telling consumers that the only way to boil water electrically is by means of an electric kettle.

As to egg boiling, I have told many consumers to put the eggs in the kettle and have been rewarded next call with genuine thanks for an obvious piece of common sense.

Maybe the companies need real salesmen trained by experience to replace the technical figureheads too often found in charge of the consumers' department. Albert E. Godsell.

Glasgow, *March 4th.*

# New Books

**Electrical Engineering Testing.** By G. D. Aspinall Parr. (Fourth edition). Pp. 691; figs. 296. London: Chapman & Hall, Ltd. Price 8s. 6d.

This work is remarkable in so far that so much material of scientific value has seldom been offered at so moderate a price. Descriptions of some 160 tests have been accurately recorded in a manner likely to stimulate thought on the part of students; those who follow the very complete instructions and hints are not likely to carry out their work simply as a matter of routine, a fault which it is necessary to guard against when arranging laboratory instruction.

Tests in connection with d.c. and a.c. circuit work and on d.c. and a.c. generators and motors constitute the main contents of the book, though other matters are not neglected. The only considerable section of the subject to which no reference is made is that relating to thermionic valves, the present-day importance of which warrants some attention on the part of practically all students of electrical engineering.

Attention to one point in the next edition would, we believe, add to the usefulness of the book. While it is true that the electrical principles which need to be demonstrated in connection with laboratory work change very slowly, the appliances in which these principles are used and the terminology employed in connection therewith change more rapidly and it is desirable that full weight should be given to this point. Thus in connection with the photometry of filament lamps, no use appears to be made of the lumen. and efficiencies are expressed as so many watts per candle power, though it is pointed out that this is really a measure of inefficiency. Further, in connection with the measurement of light output the use of the sphere or cube integration photometer is not considered. Again, while a number of experiments involving the use of the Duddell oscillograph are described, there is no account of the use of the cathode-ray type, which is now playing an important part in laboratory instruction.

Minor additions which might be incorporated when opportunity occurs include sections dealing with the testing of arc-type rectifiers, of a.c. commutator motors having shunt characteristics, and of power-factor improving devices for use in connection with induction motors. Nevertheless, any student reading the book and carrying out a selection of the experiments should obtain a comprehensive knowledge of electrical engineering testing.

**Electric Power Metering.** By A. E. Knowlton. Pp. 340; figs. 215. London: McGraw-Hill Publishing Co. Price 24s.

This book is a comprehensive treatise on the theory and practice of measuring energy and demand in a.c. and d.c. circuits, and of the determination of kVARh and kVAh. The theoretical portions cover not only the fundamentals of energy measurement but also the underlying principles of meters and instrument transformers. This theory includes an account of the conception of symmetrical components and the application of this conception to metering problems.

The author's analysis is skilfully presented, being penetrating in character while involving the use of but the simplest mathematics. The descriptive portions of the work deal not only with a.c. and d.c. supply meters but with instrument transformers, reactive and kVA meters, demand indicators and with modern systems of aggregate and distant metering. The practical portions of the book are of great importance. The testing of instrument transformers for ratio and phase errors is dealt with in detail, but no reference is made to the methods of testing which have been developed in this country. The section on meter testing includes an interesting account of the methods of obtaining artificial power factors. An important chapter is devoted to the matter of checking the connections of polyphase meters, used with current and voltage transformers, after erection.

The chapters on reactive and kVA meters are very good, and it is gratifying to note here that the author describes the theory and construction of two kVA meters of non-American origin. In view of the limitations of three-phase reactive meters with external voltage compensation, a reference might have been made to the single-phase reactive meter with a double voltage magnetic circuit. Reference might also have been made to the ambiguity of the meaning of reactive power in single-phase circuits in which the wave-forms of current and voltage differ. This matter is ignored by the author in his definition of power factor as the cosine of a phase angle.

Appended to each chapter is a valuable and novel collection of metering problems for solution by the student. Mr. Knowlton's book is one of the best of the many works on the technique of electrical measurements which have appeared in recent years. It should be studied by all test-room assistants, and should find a place on the shelves of all engineering libraries.

**Electricity and Magnetism.** By S. R. Humby. (First edition.) Pp. 235; figs. 128. London: John Murray. Price 3s. 6d.

This unpretentious little book, emanating from the Science School of Winchester College, presents the simple basic laws of electricity and magnetism up to the standard required for the School Certificate and the matriculation examinations of the various universities. In a manner suited to the requirements of students for these examinations it surveys the properties of magnets and magnetic fields, electricity at rest and in motion, the various effects of electric currents, e.m.f. and potential difference, resistance, induction and electrostatics.

The modern "atmosphere" with which the author has surrounded what often is a rather dry and uninteresting period of study is refreshing and to be commended, and it should make the book welcome, as the author has planned it to be, to "a boy or girl . . . as part of an education for life in a modern world." It may, in fact, be read with pleasure and profit by very much older students for whom the passage of years has obliterated all but the faintest memories of their first introduction to this absorbing subject.

* * *

## Shorter Notices

"Electro-Plating—A Survey of Modern Practice." By S. Field and A. D. Weill. (2nd edition.) Pp. 256; figs. 55. London: Sir Isaac Pitman & Sons, Ltd. Price 7s. 6d.

"Factory Administration in Practice" (Hiscox). Second edition by J. R. Price. Pp. 274; figs. 96. Price 8s. 6d.

"Engineering Economics—Volume 1," by T. H. Burnham. Pp. 280; figs. 9. Price 8s. 6d.

"Modern Radio Communication," by J. H. Reyner. Pp. 330; figs. 157. Price 5s. London: Sir Isaac Pitman & Sons, Ltd.

"Esercizi di Electrotecnica," by Stefano Basile. Pp. 211; figs. 120. Bologna: Nicola Zanichelli.

"Normalisations, Spécifications et Régles Techniques—1935." Paris: Union des Syndicats de l'Electricité.

# New Apparatus and Devices

## for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

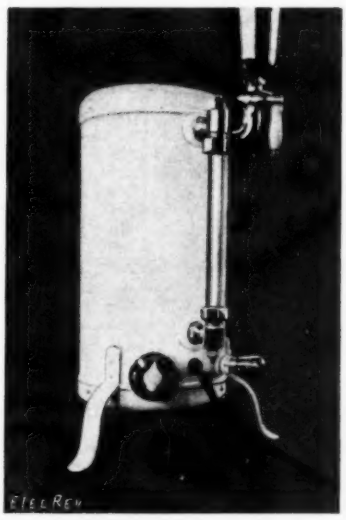
### "Daylight" Shades

Particulars have been sent to us by Holmes-Wedgwood Shades, 63, Queen Victoria Street, London, E.C.4, of a new range of reflectors designed to give north daylight for colour matching and special lighting, or, with an ordinary bulb, a partially corrected light, the semi-matt blue surface of the reflector absorbing the red and orange rays from the lamp. Various shapes are available, either 12 or 14 in. in diameter. A vertical screen inside the main reflector is optional, and the shades are suitable for 75 to 100 W or 150 to 200 W. There is also a special concentrating reflector, with or without shield, and an angle shade for 60- or 100-W lamps.

**A new Holmes-Wedgwood shade**

### A Hairdressers' Steam Heater

Made specially for hair-dressing establishments an electric steam heater manufactured by Thermics, Ltd., 39, Little King Street, Camden Town, London, N.W.1, consists essentially of an internal container of brazed copper enclosed in an outer case of lead-coated steel, the space between being lagged with regranulated cork to keep the outer case at a low temperature. The inner chamber holds four pints of water, leaving a 3-in. space above to prevent boiling water thrown up from entering the steam outlet pipe. The outlet is connected to two horizontal distribution pipes, one for steam and the other for moisture produced by condensation. The latter pipe feeds back to a cup of ½ pint capacity provided with a cock and can be used again, thus reducing furring in the heater to a considerable extent.



**The new Thermics steam producer**

The 1,500 W spiral element is wound on a steatite former and attains a temperature of approximately 500 deg. C., sufficient to bring the water to the boil from cold in just over 10 min. and to give continuous boiling for 40 min. until the water has evaporated. The switch in the high position permits the upper section of the element, which is out of the water, to give a degree of superheat to the steam.

A gauge is fitted to indicate the amount of water in the container. A small neon lamp shows when the heater is on. The standard finish is glossy white cellulose with chromium-plated metal parts.

### A Seven-in-One Battery Tool

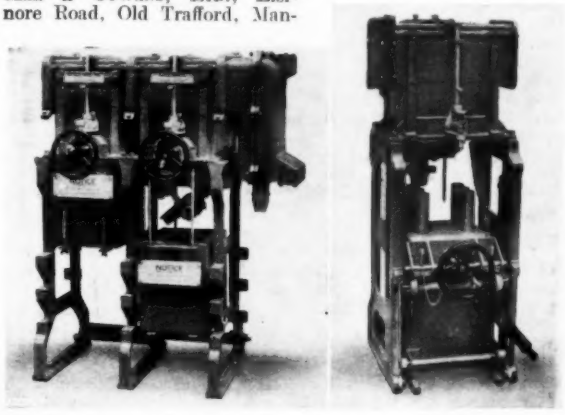
Equipments, Ltd., 152-6, Great Portland Street, London, W.1, have recently put on the market a hand tool known as the "Seven-in-One," which should prove useful to electric battery repairers. Shaped on the line of pincers or pliers, it is made of drop-forged steel, nickel plated and acid-treated. Its slender separated jaws will grip worn or tight clamping nuts, or provide a combined prising and lifting action for removing battery clamps from tight posts.

The reverse ends of the jaws are sharpened, axe fashion, and may be used as a chopper or as a cold sett for cutting away clamps and straps. Using the hook end of one of the handles below an inter-cell strap, a good grip upon a battery for removal or replacement in awkward corners can be obtained. Used in conjunction with the other handle, the hook also forms an adjustable cee spanner for castellated post nuts. Terminal clip bolts can be forced out with the jaws, and the hole can be reamered with the reverse shank of the hooked jaw.

**On the left is a specially designed fan made by Ozonair, Ltd., St. Leonard Street, London, S.W.1, for fitting to their standard "128" portable ozone apparatus**

### Non-automatic Switches

Two forms of oil-immersed non-automatic switches have been developed as standard self-contained units by Switchgear & Cowans, Ltd., Elsinore Road, Old Trafford, Manchester, 16, for ratings up to 500 A and 11 kV. They may be employed as switchboard isolators, groupers and couplers, or made to form consumer's units for tapping ring mains when coupled with automatic circuit-breakers for the transformers.



**The S. & C. metalclad switch is shown on the left with one tank lowered to reveal the switch mechanism. Another view (right) shows the switch unit lowered to the isolated position**

In the fixed pattern access to the switch is obtained by lowering the oil tank; in the second form the complete switch may be isolated by being dropped down and drawn forward for inspection.

The switch mechanism is of the knife type, with auxiliary spring-controlled quick-break blades hinged to stationary spring jaw contacts, which project through the top plate into the component-filled bus-bar or terminal chamber, into which the contact terminals from the cable box are also extended. Any number of units can be coupled together or combined with other apparatus, and fitted with bus-bars to form a switchboard.

The operating hand-wheel has four positions—"on," "off," "earth" and "test." Spring-controlled mechanism holds the switch, or the hand-wheel may be padlocked in any of the operating positions. The switch blades cannot be thrown out of position by a through short-circuit.

Visible interlocks prevent the switches being isolated or plugged in except when in the "off" position. The tank cannot be removed until the switch is isolated, nor can the switch be plugged in until the tank has been replaced, *i.e.*, the switch can only be plugged in as a complete unit. The sockets cannot be uncovered until the cable has been discharged by moving the switch handwheel through "off" to "earth" and back to "test"; neither can the switch be put "on" until the test plugs have been removed, the operating handle taken to "earth," the test sockets covered, and the switch put to "off."

Cable boxes may be attached at the back and at either end of the bus-bar or terminal chamber.

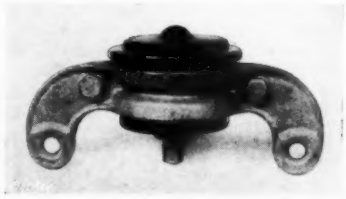
**Three new Walker Fender lamps shown at the B.I.F., White City**

D

## A Trolley-line Fitting

BRITISH INSULATED CABLES, LTD., Prescot, Lancs., are now in a position to supply porcelain insulated hangers and pull-offs of the loose bolt type fitted with insulated caps. The objects of the design are to provide a belt which passes through the porcelain, giving a greater bearing surface and increasing the mechanical load that can be safely applied when used in a pull-off, and an insulated top to eliminate the danger from short-circuits to men working on the line.

The insulated top has a metal core, and in the case of a fractured porcelain is of such a size and shape that it will not pass through the supporting fitting, thus preventing the wire falling or, on curves, allowing the outer negative wire to swing inwards and make contact with the inside positive wire. There is a projection on the under side of the insulated top which fits a recess in the top of the porcelain, thus forming a lock against the possibility of slacking back. On the under side of the porcelain a copper lock washer is provided to prevent the bolt slacking in the insulated top; thus cap and bolt are locked relatively to the porcelain.

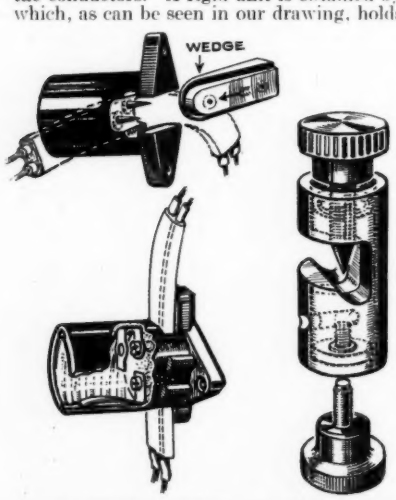


**A B.I. porcelain insulated double pull-off with insulated cap**

The insulator and bolt complete are screwed into the boss of the ear, a hexagon collar to fit a standard spanner being provided on the bolt just below the insulator for this purpose; during erection the bolts of the supporting fitting are slackened off to allow a free turning movement of the insulator. The bolt screws into the insulated cap by a left-hand thread, so that any obstruction to the turning of the insulator when being screwed into the ear would tend to screw the bolt farther into the insulated cap.

## Temporary Wiring for Illuminations

An unusual method of assembly is incorporated in the new G.E.C. temporary wiring system, samples of which we recently examined. The wedge-type strip-lighting lampholder, designed for use with 7/.029 in. twin t.r.s. cable has two prongs on its underside which pierce the cable and make contact with the conductors. A rigid unit is obtained by means of a wedge, which, as can be seen in our drawing, holds the cable firmly in its groove.




**Constructional drawings of G.E.C. temporary wiring equipment**

The wedge principle is designed to facilitate speedy wiring. There are no screwed parts to be damaged, and the wedge can be pushed home by hand, although where large numbers of lampholders are involved, it will be found more convenient to use the special forked pliers which the makers supply. The lampholder can be weatherproofed by pushing the wedge right home and using rubber rings on the lamp caps.

For making wood letters and other devices the E.S. pattern (illus.) is recommended. The required number of holes are drilled in the woodwork, and the lampholders are inserted from the back, coming to rest against four stops, and are fixed by two screws. The bottom of the cable grooves are then level with the back of the wood panel, and the whole of the wiring can be carried out afterwards.

Another new G.E.C. product is a strong moulded bakelite accessory for the provision of tappings from insulated distribution lines without removing the insulation. It is fitted with a metal piercing screw and is designed to accommodate main conductors up to 19/.072 in. p.b.j. or d.b. aerial cable, or 19/.064 in. v.i.r. taped and braided cable, and branch tappings up to 7/.064 in. conductors. Both these accessories are made by the GENERAL ELECTRIC CO., LTD., Kingsway, W.C.2.

## Modern Table Standards

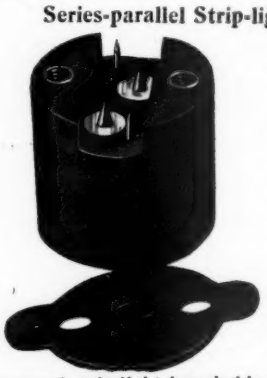
**These new table standards made by Aladdin Industries, Ltd., Greenford, Middlesex, were on view at the British Industries Fair (Olympia)**

## The "Sunsette" Fire

A swivelling fire of artistic design, known as the "Sunsette" is a new product of BERKELEY & YOUNG, LTD., Tyseley, Birmingham. The circular body is adjustable for angle, and there is an air channel at the back of the elements, the inlet being provided by holes round the bottom edge of the fire, and the outlet above the elements. The body is spun from solid copper, and either chromium-plate or florentine bronze finish is obtainable. A switch gives loadings of 1 or 2 kW.

**The B. & Y. "Sunsette" fire**

## Series-parallel Strip-lighting Lampholders



**Improved strip-light lampholder**

We are informed that the moulded strip-light lampholders made by INTERNATIONAL LAMPS, LTD., 173, Farringdon Road, London, E.C.1, have been improved so that they can now be used for series and parallel wiring. It is suggested that instead of using low wattage vacuum lamps at mains voltage 12-V, 12-W gas-filled lamps should be employed, connected in series. Our illustration shows the contact pins and the method of holding the cover which grips the t.r.s. cable in position.

**Three Devon pottery table standards shown at the British Industries Fair (Olympia) by Messrs. Candy & Co., Ltd., Heathfield, Newton Abbot, South Devon**

## The "Instantair" Valve

Particulars have been sent to us of the new valve known as the "Instantair" and made by B.E.N. PATENTS, LTD., Gorst Road, Park Royal, London, N.W.10. The quick-acting bayonet coupling eliminates the use of shut-off valves when attaching air-operated devices to an air-line system. In this model an improved method of securing a perfect air seal is incorporated. In plugging together to connect the two halves, the nipple of the plug first passes through a hat-shaped rubber washer, forming an air seal and afterwards raises a non-return valve from its rubber seating. This allows air to flow through the coupling but at the same time prevents the momentary loss of compressed air when connecting the two halves.

All parts subject to wear are made of case-hardened steel, and two rubber rings serve as a handgrip and prevent damage from contact with concrete floors, &c.

# Electrical Imports of the United Kingdom

## Continued decline in machinery figures in 1933

FIGURES of the import trade of the United Kingdom, showing countries of origin, are furnished in Volume II of the Annual Statement of Trade published by H.M. Stationery Office (32s. 6d. net) under a more detailed classification than that adopted in the monthly statistics.

The imports of the electrical goods and apparatus group in 1933 were approximately £300,000 less in value than in 1932, and they were nearly £4,000,000 below the 1931 level. Electrical machinery imports aggregated £227,000 in 1933, £407,000 in 1932, and £1,636,000 in 1931; these figures do not include vacuum cleaners: £177,000 in 1933, £439,000 in 1932, and £793,000 in 1931.

| | 1933. £ (000). | Inc. or dec. compared with 1932 £ (000). |
|---|---|---|
| *Wires and cables, rubber insulated (not telegraph or telephone)*— | | |
| Total | 87 | − 19 |
| From Germany | 46 | − 1 |
| „ Belgium | 19 | − 23 |
| *Wires and cables, insulation other than rubber (not telegraph or telephone)*— | | |
| Total | 137 | − 57 |
| From Germany | 60 | − 28 |
| „ Holland | 28 | − 12 |
| „ Belgium | 21 | — |
| *Telegraph and telephone wires and cables (not submarine)*— | | |
| Total | 2 | − 4 |
| *Radio receiving sets (except valves)*— | | |
| Total | 135 | + 31 |
| From United States | 105 | + 15 |
| „ Canada | 24 | + 15 |
| *Radio transmitting apparatus (except valves)*— | | |
| Total | 6 | + 4 |
| *Radio valves*— | | |
| Total | 101 | + 2 |
| From Holland | 23 | − 2 |
| „ Belgium | 33 | + 14 |
| „ Austria | 72 | + 10 |
| „ United States | 39 | − 12 |
| *Other radio parts and accessories*— | | |
| Total | 447 | − 84 |
| From Holland | 278 | + 75 |
| „ United States | 70 | − 55 |
| „ Canada | 14 | − 10 |
| *Other telegraph and telephone instruments and apparatus*— | | |
| Total | 41 | + 1 |
| From Germany | 10 | − 2 |
| „ Belgium | 14 | + 4 |
| „ United States | 9 | — |
| *Lighting carbons*— | | |
| Total | 43 | + 10 |
| From Germany | 36 | + 9 |
| *Furnace carbons*— | | |
| Total | 56 | + 22 |
| From Canada | 46 | + 33 |
| *Lamps, 20 V. and over, gas-filled*— | | |
| Total | 31 | + 16 |
| From Japan | 15 | + 14 |
| *Other lamps, 20 V. and over*— | | |
| Total | 90 | + 29 |
| From Japan | 70 | + 29 |
| *Bulbs for flash lamps*— | | |
| Total | 59 | − 34 |
| From Japan | 40 | − 22 |
| *Lighting appliances, unspecified*— | | |
| Total | 216 | + 26 |
| From Germany | 108 | + 13 |
| „ Holland | 36 | − 3 |
| „ United States | 34 | + 9 |
| *Batteries, primary, for flash lamps*— | | |
| Total | 1 | − 6 |
| *Other primary batteries*— | | |
| Total | 7 | − 49 |
| *Accumulators, portable*— | | |
| Total | 3 | − 10 |
| *Accumulators, stationary*— | | |
| Total | 6 | — 8 |
| *Elec. bell apparatus (not telegraphic or telephone)*— | | |
| Total | 18 | − 2 |
| From Germany | 18 | − 2 |
| *Ammeters, voltmeters, etc.*— | | |
| Total | 70 | + 9 |
| From Germany | 23 | − 13 |
| „ Switzerland | 33 | + 29 |
| *Scientific elec. instruments*— | | |
| Total | 64 | − 28 |
| From United States | 22 | − 22 |
| „ Germany | 18 | + 2 |
| *House service meters*— | | |
| Total | 57 | − 31 |
| From Germany | 53 | − 21 |
| *Parts of house service meters*— | | |
| Total | 95 | − 3 |
| From Switzerland | 61 | − 3 |
| *Cooking and heating apparatus*— | | |
| Total | 66 | + 15 |
| From United States | 33 | + 17 |
| „ Canada | 14 | + 8 |
| *Electro-medical apparatus (other than X-ray tubes and vacuum tubes)*— | | |
| Total | 42 | − 11 |
| From Germany | 23 | − 10 |
| *Elec'l goods and apparatus, unspecified*— | | |
| Total | 232 | − 107 |
| From Germany | 102 | − 91 |
| „ Holland | 6 | − 4 |
| „ France | 43 | − 5 |
| „ Switzerland | 10 | − 9 |
| „ United States | 43 | − 52 |
| „ Canada | 4 | − 3 |
| *Machinery*— | | |
| *Generators, above 200 kW.*— | | |
| Total | — | — |
| *Generators, not above 200 kW.*— | | |
| Total | 10 | + 3 |
| *Motors (other than railway and tramway), above 250 h.p.*— | | |
| Total | — | − 6 |
| *Motors (other than railway and tramway), not above 250 h.p.*— | | |
| Total | 133 | − 26 |
| From Sweden | 21 | − 14 |
| „ Germany | 15 | − 19 |
| „ United States | 71 | − 10 |
| „ Canada | 11 | + 6 |
| *Convertors and transformers, static*— | | |
| Total | 6 | — |
| *Convertors and transformers, rotary*— | | |
| Total | 4 | — |
| *Switchgear*— | | |
| Total | 9 | − 10 |
| *Motor starting gear and control gear*— | | |
| Total | 1 | − 10 |
| *Vacuum cleaners*— | | |
| Total | 177 | − 262 |
| From Canada | 108 | − 277 |
| „ Sweden | 34 | + 10 |
| *Elec'l machinery not elsewhere specified*— | | |
| Total | 63 | − 128 |
| From Germany | 13 | − 43 |
| „ Holland | 41 | − 36 |
| „ France | 17 | − 18 |
| „ Sweden | 5 | + 3 |
| „ Switzerland | 3 | − 5 |
| „ United States | 17 | − 29 |
| „ Canada | — | − 5 |

# The American Trade Outlook

THAT world-wide interest has been aroused by President Roosevelt's far-reaching, and in some respects unorthodox, efforts to restore confidence in the United States and then to reform its economic life cannot be denied, and the report of Mr. H. O. Chalkley, H.M. Commercial Counsellor at Washington, ranks high among the books and treatises on this subject. It consists of 135 pages, in addition to which there are copious appendices, and has recently been issued by H.M. Stationery Office for the D.O.T., price 5s.

So manifold are the complications of the situation which Mr. Chalkley sets out to review that his introduction alone consists of no fewer than fifteen pages. These constitute a closely reasoned and concise statement of the events which led to the crisis of March, 1933, its main characteristics, measures adopted to overcome it, the results achieved in the different fields, and the prospects of further success.

In an appendix there are a number of indices of recovery, embracing industrial production, employment, wholesale, retail and foreign trade, prices, and bank deposits. Comparison is made between November last and March, 1934, and March 1933, and the average for the year 1932. Mr. Chalkley says that a concise summary of these indications of progress and prospects of recovery in the United States will show agriculture in a large measure restored and its disparity with industry redressed; sound banks and plentiful credit; industrial and trade recovery sporadic and partial, but real; labour materially benefited and in a state of latent unrest; the problem of unemployment unsolved, but with responsibility accepted by the community for its relief. The outlook, he adds, is definitely for the further development of these conditions and for further improvement of the same nature, with full recovery waiting not directly, but indirectly on the return of prosperity to the remainder of the foreign trading world.

From the author's observations regarding the consistently unfavourable balance from the British point of view in American trade with the United Kingdom, little consolation can be derived. Only a limited group of United Kingdom products, he says, would be advantageously affected by appreciable reductions in United States tariff and administrative barriers (reductions which, it may be added, are not in sight). The industrial development of the two countries is so similar that tariff reductions alone could not be expected to result in a substantially increased volume of general imports. It is probable that a full return to prosperity and spending capacity would be more effective than minor tariff reductions.

Some remarkable figures are given in a paragraph in the report dealing with the output of electrical plant and equipment. The total value of products made in 1933 by establishments engaged primarily in the manufacture of electrical machinery and apparatus and supplies amounted to $550 millions, according to statistics compiled by the Bureau of Census. This total compared with $995 millions in 1931 and $2,301 millions in 1929. Throughout 1934 activity was limited largely to the lighter lines, such as motors, household appliances and lamps. Fairly satisfactory profits, it is stated, appear to be a definite possibility in the lighter lines this year, but profitable operations in heavy equipment are unlikely for another year.

Since Mr. Chalkley's report was written the legality of certain phases of the programme has been questioned from their constitutional aspect and decisions, even in the Supreme Court, have gone against the Administration. That court has decided that the President has no authority to prohibit transport from one State to another and has thus interfered with the oil restriction scheme. A Federal Court has declared that the Tennessee Valley Authority cannot legally sell electric power in competition with private companies; and another that the collective bargaining clause of the National Industrial Recovery Act cannot be enforced. With regard to the decisions of the Federal Courts, it remains to be seen what the Supreme Court will declare when appeals are heard. On the far more important matter of the gold clause the Supreme Court's finding, although to some extent a compromise, virtually upheld the President.

# Parliamentary News (BY OUR SPECIAL REPORTER)

ON February 27th the position of local authorities with regard to the erection of overhead electric mains was discussed before the Special Orders Committee of the House of Lords when the West Devon Electricity Extension Order was under consideration. Lord Stanmore presided.

Sir John Brooke, who attended on behalf of the Electricity Commissioners, said the Order was originally made last year, but it was objected to by the Bideford Rural District Council and was not presented to Parliament for approval. The Order was now presented in its original form, but in the meantime certain undertakings had been given by the promoters to meet the Council's objections.

The Council's chief fear was lest the beauty of Clovelly should be spoiled by overhead electric lines being erected in the main street. As a matter of fact, that could not be done without the consent of the Ministry of Transport, but in order to satisfy the Council the promoters had given an undertaking to put the mains there underground. They had also given an undertaking to consult and attempt to agree with the Council before applying to the Ministry for consent to the erection of further overhead lines in other parts of the area.

Up to 1919 the consent of the local authority had to be obtained to the erection of overhead mains, but the Electricity Supply Act of that year provided that if that consent was withheld it could be dispensed with by the Board of Trade. That power had now been transferred to the Ministry of Transport. Since Parliament had entrusted to the Ministry the duty of seeing that overhead mains were not put up in such a way as unnecessarily to injure amenities there did not appear to the Electricity Commissioners any reason for making an exception in this area, although it was recognised that it was a beauty spot.

The Chairman asked whether there were cases in which the Ministry had insisted on mains being put underground in rural areas. Sir John Brooke said there were numerous cases. Lord Askwith asked whether the agreement to put the mains underground in Clovelly could be made a statutory agreement without creating a precedent. Sir John Brooke said it could be made an agreement referred to in the Order, but there was no precedent for doing that, and he thought the undertaking given would be effective and would make the District Council's position absolutely secure.

In reply to Lord Mersey, Sir John Brooke said the additional cost of putting the mains underground would be borne by the electricity undertaking. Lord Askwith said that as Clovelly High Street consisted of a series of steps it seemed likely to be an expensive business.

After further discussion, the Chairman said the committee was anxious that the beauty of Clovelly should be preserved, and it thought that the point was met by the undertaking given. The Order was reported to the House for affirmative resolution.

### Abandonment of Norwich Tramways

On February 28th the Norwich Electric Tramways Bill was considered by a Select Committee of the House of Lords, presided over by Lord Liverpool. By this Bill the tramways company seeks power to abandon the tramways in sections within a period of two years and to substitute buses, and also to enter into working arrangements with the Eastern Counties Omnibus Co. The Bill was opposed by the National Union of General and Municipal Workers.

Mr. Walter Monckton, K.C., for the promoters, said that the petitioners were asking for the insertion of a clause providing for compensation for displaced workers on the analogy of the provision made in the Electricity Supply Acts. Such a clause was without precedent in Bills of this kind. The promoters could not assent to it, but they had offered to make an agreement giving the men a guarantee of at least a year's employment from the date of abandonment of the tramways with certain pension rights. Those terms satisfied the Transport Workers' Union to which some of the men belonged. If the petitioners' demands were granted it meant that a man over fifty, earning £3 a week, with thirty-five years' service—and there were a number of such men—would have to be paid over £600. The company's finances would not stand that.

Mr. Neap, counsel for the petitioners, said they did not want to press the company unduly, and suggested reduced terms of compensation. The Chairman said that the company's offer was fair, and the Bill would be allowed to proceed.

### Railway Electrification and Coal Consumption

On February 28th Mr. North asked the Secretary for Mines if he could give any estimate of the reduction in the quantity of coal required annually by the railway companies of this country if they were to electrify their main lines.

Mr. E. Brown said that the Committee on Main Line Electrification, which reported in 1931, estimated that, in the event of the electrification of the railways, the amount of coal required for the production of the necessary electricity would be about 3,650,000 tons. On the basis of present coal consumption by railway locomotives this would represent a net reduction in coal consumption of rather more than 8 million tons.

### Supply for a Village

On February 26th Brigadier-General Clifton Brown asked the Minister of Transport whether, in view of the fact that the Mid-Southern Utility Company had failed to supply Slinfold with electricity, though it obtained authority to do so in 1929, he would now grant authority to the Horsham Urban District Council to supply electricity to Slinfold, in accordance with a request made to the Electricity Commissioners in October, 1934, by the Slinfold Parish Council.

Mr. Hore-Belisha said he was aware that there had been delay on the part of the company in providing a supply of electricity to Slinfold. This delay was in part accounted for by the difficulties experienced by the company in settling the route for the proposed h.p. line to supply this place, and in obtaining the necessary wayleaves. He understood that the company had already placed a contract for the work and anticipated that in the absence of unforeseen difficulties the line should be completed in three or four months' time. In all the circumstances, it would hardly be reasonable not to afford the company an opportunity of carrying out the work.

### Radio Interference from Trolley Buses

On March 4th Mr. Holford Knight asked the Postmaster-General whether he could make a statement as to the tests recently carried out at Nottingham with stopper coils to prevent interference with broadcasting programmes by the trolley omnibuses of the Nottingham Transport Department.

Sir K. Wood said he had received a report on the tests recently carried out at Nottingham with the use of suppressor coils on trolley omnibuses. The report was of a detailed character, but the general conclusion reached was that the use of the coils resulted in a material reduction of interference with wireless reception.

### The Penny Post

On March 4th, asked by Mr. V. Adams if he would shortly restore the penny post, Sir K. Wood replied in the negative, stating that to do so would cost the revenue £6,000,000.

# In the Courts

IN the Railway and Canal Commission Court before Mr. Justice Mackinnon, Sir Francis Taylor, K.C., and Sir Francis Dunnell on February 27th an appeal was heard on behalf of the Postmaster-General from the refusal of the Edmonton deputy-judge of the County Court to consent to an application of the P.M.G. for leave to place overhead telephone lines with posts in four streets in Southgate, Middlesex. The respondents were the Mayor, aldermen and burgesses of the Borough of Southgate.

The Attorney-General (Sir Thomas Inskip, K.C.), who appeared for the P.M.G., said it would be necessary to consider the provision of the Telegraph Acts, which included the Acts of 1863, 1868 and 1878. The P.M.G. desired to erect four posts in Southgate. In an urban district such as this the usual method was to take the wires underground to certain strategic points and then erect posts which would enable lines to be distributed in particular streets.

Mr. Montgomery supported the decision of the County Court Judge on behalf of the respondents.

In delivering judgment on February 28th, Mr. Justice Mackinnon said that the proceedings arose under the Telegraph Act, 1878. Having referred to the four places where the P.M.G. desired to erect the poles, his Lordship said that in all the cases except one the application of the P.M.G. was for the erection of a pole near an existing one. The Southgate Council refused consent on the ground that the amenities of the district would be affected.

The cost of the overground and underground systems was £55 and £361 respectively. The County Court judge, in saying that the difference was negligible, probably meant that in his opinion there would be such an increase in the number of telephone subscribers that the revenue to be derived by the Post Office from the extension would be such that it could afford the outlay for the underground system.

His Lordship said he did not find there was sufficient beauty in the streets concerned to warrant the decision of the Deputy County Court judge, and in the result he thought that his decision was wrong and in his opinion the appeal must be allowed.

Sir Francis Taylor and Sir Francis Dunnell concurred, and the appeal was accordingly allowed and consent given for the erection of the four poles. The Court decided to make no order as to costs.

### Electrical Engineer's Slander Action

Mr. William Welbury, electrical engineer and manager to the Bridgend (Glam.) Urban District Council, was the plaintiff in an action for slander that was heard at the Glamorgan

# Business and Industrial Notes

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures**

## Industrial Coventry

Electrical companies and firms when making plans for starting new manufacturing operations would do well to consider the merits of Coventry as an industrial centre. We recommend them to write for a copy of a booklet issued by the Development Department of the Corporation from the Council House, Coventry, wherein they will find, in far more compact form than is usual with such publications, particulars of the many well-known factories in the area that are devoted to the production of aeroplanes, motor-cars, cycles, radio apparatus and telephones. It is significant of the appreciation in which Coventry continues to be held that in the erection of new factories, 70 plans were passed during 1934 for the extension of works in the city. Its position as a distributing centre, transport and electricity supply facilities, and many other useful matters are very concisely indicated.

## E.D.A. Activities

Particulars are given in the March issue of the *E.D.A. Bulletin* of the Sales Management Conference to be held in London from March 25th to 27th. On the first day the question of local publicity will be discussed and papers on the subject will be read by Messrs. G. A. Proctor (sales manager, Manchester), and W. J. Bache (electrical engineer, Cheltenham). On the following day showroom and staff organisation will be dealt with, papers being contributed by Messrs. D. Bellamy (commercial manager, Hull), E. J. Jennings (secretary and commercial manager, Birmingham), and L. Howles (general manager, South Wales Power Co.). Mr. V. W. Dale will read a paper on exhibition work on the morning of the third day, and in the afternoon a visit will be paid to the Ideal Home Exhibition.

We have before us a quite imposing report, though it is really only a summary, concerning one week's operations in connection with the E.D.A. film campaign. It covers the week ended February 23rd, during which period 111 shows were given to audiences aggregating 16,770 people and averaging 151.1 per show. At thirty-one shows the representative of the electricity undertaking personally collected the inquiry cards at the end of the performance. At the remaining eighty shows the contractors (the Western Electric Co., Ltd.), collected 5,304 cards from audiences aggregating 10,593 people, a gratifying result when one notes that 50.01 per cent. of the people present were sufficiently interested to ask for more information. We understand that nearly 6,000 performances have now been booked.

## An E.D.A. Luncheon at Manchester

Viscount Falmouth, Sir William Ray, and the mayors of eight Lancashire towns, attended the sixth annual luncheon of the North-West England and North Wales Area of the British Electrical Development Association at the Midland Hotel, Manchester, on February 27th. Sir William Ray, in referring to the activities of E.D.A., said that a big scheme was afoot for national and provincial Press advertising and this would be made effective within the next few months. Despite its limited resources E.D.A. had spent no less than £50,000 on Press publicity in the past eighteen months. At the moment it was engaged in a campaign to establish contact with professional men, realising that it was through them that it would have to exercise its influence to promote development.

Mr. L. Romero, city electrical engineer of Salford, and chairman of the Area Committee, said it had been suggested to him that electrical development should be held up because of its effect on an older competing form of service, which, in his opinion, was an inevitably diminishing factor. His opinion was that the public should be allowed to choose the one which they preferred. During the year the North-Western Area, under the scheme of reorganisation, had been in close co-operation, in the exchange of ideas and experiences between engineers of the various undertakings, and also between their sales staffs. The Area Committee had recently organised a series of regular meetings of chief sales assistants, believing that these contacts could not fail to be of benefit to all. The Lord Mayor of Manchester (Ald. Samuel Woollam, J.P.) said Manchester had been in the forefront of electrical development for the last forty years. Its electricity undertaking had been very successful; last year it contributed £90,000 to the relief of the rates. Viscount Falmouth replied for the visitors.

The prize-winners in the Area public speaking competitions were:—Men: 1, F. F. Livock, Industrial Heating Department, G.E.C., on "The Importance of Electricity in Industrial Development"; 2, H. Hewitt, Swinton and Pendlebury Electricity Department, on "Electrical Service in Small Dwellings." Women:—1, Miss Marjorie Jackson, Ashton-under-Lyne Electricity Department, on "Electrical Service in Small Dwellings"; 2, Miss Nora Wood, Manchester Corporation Electricity Department, on "The Cheapness of Electricity if the Right Rate is Selected."

## The Cookery and Food Exhibition

The accompanying illustration shows the stand of the Simplex Electric Co., Ltd., at the Cookery and Food Exhibition held at the Royal Horticultural Hall, reference to which was made in our last issue. On this stand were exhibited samples of "Creda" hotel and restaurant pattern electric cooking apparatus.

**The "Creda" display at the Cookery and Food Exhibition**

## "Coolicon" Shades

In our last issue we referred to the offer of the Benjamin Electric, Ltd., of one guinea for suggestions for mailing cards. We have now received a further folder from the company containing details of a gold watch to the retail purchaser of the 250,000th "Coolicon"

## In the Courts *(continued from previous page)*

Assizes at Cardiff last week, the defendant being Mr. Fitzroy Sinclair Exton, a member of the Council.

The action was in respect of words alleged to have been uttered by Mr. Exton on two occasions, first at a public meeting held at the Pridgend Town Hall during the Council election in March, 1934, and again at a meeting of the Electricity Committee on the following day. *Inter alia*, it was alleged that while referring to a certain document Mr. Exton used the words "bribery and corruption," which were meant to apply to the plaintiff. Mr. Exton denied that he spoke and published the words complained of, and, alternatively, that the words, if uttered, were not defamatory; and, further, that they were uttered on a privileged occasion.

A special jury found that the words alleged to have been spoken by Mr. Exton were defamatory, and awarded the plaintiff damages of £100. Mr. Justice Lawrence entered judgment accordingly for that amount with costs.

## The London Supply Merger: Trustees' Powers

In the Chancery Division on Tuesday Mr. Justice Eve delivered his considered judgment as to the meaning of the word "amalgamation" as affecting trustees holding ordinary stock in the Westminster Electric Supply Corporation, Ltd., in view of the proposal to transfer to London Associated Electricity Undertakings, Ltd., the share capital of the Corporation (amongst others). The question for decision was whether within the meaning of Section 10 (3) of the Trustees Act, 1925, the scheme for the amalgamation, or merger, of the participating companies was one which the trustees had power to concur in, and to accept stock of the London Associated Electricity Undertakings, Ltd., in place of the stock they now held.

The case, which was a test one, came before the Court on a summons taken out by the Royal Exchange Assurance, Mr. M. N. Walker and Mr. H. C. Walker, the trustees under a settlement made by Mr. Henry Claude Walker, on whose behalf it was contended that the proposed scheme was an "amalgamation" within the meaning of Section 10 (3) of the Act of 1925, whereas, on behalf of certain beneficiaries under the settlement, it was argued that the scheme was not an "amalgamation" unless the businesses were taken over and run as one, and that there could be no amalgamation without an Act of Parliament, as all the constituent companies had powers under various Acts of their own.

Sub-section 3 of Section 10 of the Act of 1925 enacts that trustees may concur in any scheme or arrangement for the reconstruction, sale or amalgamation of the company in which they hold shares with another company, and for the release, modification or variation of any rights, privileges or liabilities attached to the securities, or any of them.

His Lordship said he could see nothing in the scheme connoting a blending together, in whole or in part, of two or more separate undertakings, or to amalgamate or fuse them into one. He did not think the present scheme involved those elements which were regarded as essential for an amalgamation. In his opinion, he ought to answer the question raised by the summons in the negative, and he made an order accordingly.

shade and a gold watch to the electrical wholesaler who supplies this particular shade. In addition, ninety-nine out of the last hundred "Coolicons" of the 250,000 will each carry a prize to both the wholesaler and the retailer recipient. Many suggestions have been received for the new mailing cards, and a selection will be made in due course.

### The Paris Trade Fair

The Paris International Trade Fair, which will be held from May 18th to June 3rd next, will cover practically all manufactured products, and will include sections devoted to agricultural machinery, electrical equipment, heating and cooking, and general machinery. In 1934 the Fair had an area of 4,000,000 sq. ft., and there were 8,000 exhibitors representing thirty-five countries. The French Railways are offering specially reduced fares to those visiting the Fair.

### Municipal Trading at Blackburn

Blackburn Corporation Electricity Committee has reconsidered the question of revising hire-purchase and cash buying terms for electrical appliances in the electricity showrooms to which the Electrical Contractors' Association objected. The Committee now proposes that the hire-purchase period shall be increased from three to six years, and that cookers shall be installed complete for approximately 10s. per quarter; water heaters for 4s. per quarter; and wash boilers for 4s. 10d. per quarter. The special terms will be confined to cookers, heaters and boilers supported by a manufacturer's guarantee to cover maintenance. Other appliances which fulfil the conditions will be included in the scheme. Mr. R. H. Harral (borough electrical engineer) reported that development of this load was of vital importance as progress in the past had been limited in that direction because of existing hire-purchase terms, under which consumers had to pay a comparatively heavy quarterly charge. For cash sales the Committee proposes that instead of the 10 per cent. discount to which the contractors objected, 5 per cent. shall be allowed off the list prices, and also off the price of an installation paid for before the work is put in hand. This discount will not apply to proprietary articles such as lamps.

### Sheffield Contractors' Dinner

Mr. E. Morgan, formerly general manager of the Sheffield Corporation Electric Supply Department, condemned cheap and dangerous electrical apparatus when speaking at the annual dinner of the Sheffield branch of the Electrical Contractors' Association (Inc.) last week. He referred to the inferior apparatus manufactured in foreign countries and urged the need for an "approving house" to sanction electrical apparatus and to safeguard users and the good name of the industry. Proposing the toast of the Electrical Contractors' Association and Allied Associations, Councillor W. J. Hunter said there were many ways in which the Association helped the trade. There was perhaps a greater need of skilled workers than ever before, possibly due to the fact that apprentices had not been so well looked after. Mr. H. Marryat, president of the E.C.A., said that until now various organisations throughout the country had been acting on their own, unguided by any main government. However, after seven years' effort it was probable that there would be unanimous agreement between all the various bodies. Councillor J. A. Longden, chairman of the Electricity Committee, Mr. H. Wheeler, president of the Sheffield branch, and others also spoke.

### Tin in 1934

Detailed statistics of tin production and consumption up to the end of 1934 are contained in the February issue of the Hague Statistical Bulletin of the International Tin Research and Development Council. The world consumption of tin in manufacture showed a slight decrease in 1934, at 130,000 tons, against 134,000 tons in 1933 (106,000 tons in 1932). Many countries consumed considerably more tin in 1934 than in 1933, notably Russia with an increase of 42.6 per cent., Canada 46.2 per cent. and Japan 16.3 per cent. The largest decrease was in the United States "apparent" consumption, which declined by 25.8 per cent. Consumption in France decreased by 5.9 per cent., and there was a slight decrease (1.8 per cent.) in Germany. The only other countries which showed decreases were Belgo-Luxembourg and Czecho-Slovakia. World production of tin in 1934 was 108,194 tons, compared with 84,963 tons in 1933 and 92,908 tons in 1932.

### Recent Contracts

Amongst recent purchasers of submersed electric motor pumps from Electromersible Motors & Pumps, Ltd., are the London Power Co., for the Battersea power station. This is an "Admiralty" type, similar to one that has been in use at the Stepney power station for nine or ten years. The North Metropolitan Electric Power Supply Co. has recently installed three submersible units for borehole pumping. Submersible motors have lately been delivered to Imperial Chemical Industries, Ltd., the Panama Railways, and the Crown Agents for the Colonies (for Palestine), in addition to several supplied to laundries, docks, and mining companies.

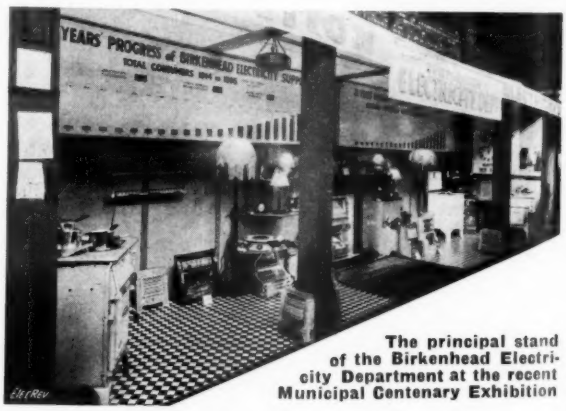
Messrs. Boving & Co., Ltd., have received an order for two vertical shaft water turbines each of 30,000 b.h.p. output, 214 r.p.m., for a net head of 167 ft. for Arapuni power station, New Zealand. Each turbine is of the spiral casing type with stainless steel runner controlled by an automatic speed control governor equipped with an electrically driven pendulum. The contract also includes two inlet valves of the butterfly type about 11 ft. in diameter having blades fitted with a special sealing device. Each valve will be operated by a servomotor piston and cylinder. The company has also received the contract for three Pelton type turbines each of 21,000 b.h.p., 428 r.p.m., for a net head of about 940 ft. for the Derwent scheme, Tasmania. Each unit will be complete with an oil pressure speed control governor, hydraulically operated inlet valve and the usual accessories. Another order received is for two valves of the butterfly type each about 10 ft. bore and blade fitted with a special sealing device for Kendoon, Scotland. Each valve blade will be operated by a servomotor piston and cylinder.

The Alton Battery Co., Ltd., reports that recent contracts received from the Post Office Engineering Department include the replating of the batteries at Coatbridge, Maryhill (Glasgow), Aberdeen, Glasgow Central and Glasgow South telephone exchanges, and the supply of complete new batteries for Hereford telephone exchange and Burnham (Somerset) radio station. In connection with the Galloway water power scheme the company has in hand repeat orders for new batteries for Earlstoun, Carsfad and Kendoon power stations. A recent shipment to Johannesburg covered three batteries ranging in capacity from 2,400 to 4,500 Ah in connection with the conversion of the telephone system in the Johannesburg area to automatic working.

Amongst orders received last week for Morrison electric vehicles were:—Twelve 10-12 cwt. and one 25 cwt. for the Derby Co-operative Society, bringing its fleet up to thirty-five Morrison electrics; three 7-10 cwt. for Kirby and Wests of Leicester; three 12 cwt. and one 15 cwt. for the Midland Counties Dairies, Ltd., Birmingham, bringing their fleet up to seventy-seven vehicles; two 12 cwt. for the County of London Electricity Supply Co., Ltd.; six 10-12 cwt. for Hovis, Ltd.; one 12 cwt. for Messrs. Goymour, Bury St. Edmunds; one 15 cwt. for the Halifax Co-operative Society, Ltd.; one 12 cwt. for the Spalding Electric Supply Co., Ltd.; one 12 cwt. for the Bedford Co-operative Society, Ltd.; one 7 cwt. for Messrs. Dudeneys, Bedford; one 12 cwt. for Messrs. Marmelsby & Parsons, of Bournemouth; and eleven 35 cwt. for the London, Midland & Scottish Railway. The company has also received orders for electric vehicles for export to Australia and South Africa.

### The Birkenhead Municipal Exhibition

In our last issue we referred to the Electricity Department's display at the Birkenhead Municipal Centenary Exhibition held from February 20th to March 2nd. In the accompanying illustration we show the Department's principal stand




**The principal stand of the Birkenhead Electricity Department at the recent Municipal Centenary Exhibition**

on which were exhibited domestic appliances and progress charts. The other stand showed domestic appliances used in 1835, and beside each was its modern electrical counterpart.

### A Sturdy Lamp

From Siemens Electric Lamps & Supplies, Ltd., we learn of an unusual adventure which befell one of its gasfilled lamps in a Reading thoroughfare. Two heavy lorries recently collided at the junction of Southampton Street and Pell Street, Reading, one of them being turned over on its side. While the derelict was being towed to a garage it swung round and demolished a traffic control standard. The steel framework was smashed, but the Siemens lamp used to illuminate the standard was not even cracked.

### The Argentine Situation

In the course of a speech delivered last week in London, Sir Miles Mattinson, K.C., chairman of the Mercantile Investment & General Trust Co., reviewed the situation in the Argentine where the company had its largest overseas investment. His remarks may be of interest in view of Mr. Siddeley's article published in our last issue. Sir Miles said that for many years a most generous return was obtained from that quarter, but during the last few years it had dwindled to meagre proportions. At the moment the outlook in the Argentine is as inscrutable as the Sphinx. On the one hand, the Argentine Government has maintained the national credit better than any other country in the Western Hemisphere, and there is the prospect at the moment of a good maize

harvest likely to be marketed at fair prices. Those are hopeful factors, but the exchange is as bad as ever and one must recognise that there are powerful influences in the Argentine which benefit by a low exchange. Improvement will come in the Argentine, but whether the current year will see increased dividends to the British investor is doubtful.

## Trade Announcements

Messrs. J. Dyson & Co., Ltd., have removed their Salisbury branch to more centrally situated premises at 47, Winchester Street, Salisbury. The telephone number remains unchanged. Ample space has been provided for show and demonstration purposes.

Messrs. Gordon & Moodycliffe, electrical engineers and contractors, have removed to larger premises at 176, Irish Street, Dumfries.

The Atlas Engineering Co. has purchased the goodwill and office records of Messrs. E. L. Youngleson, Ltd., 67/9, Chancery Lane, W.C.

Mr. A. C. Southwood, electrical contractor, has opened premises at 17, Dover Street, Canterbury.

**A busy scene in the G.E.C. Birmingham factory where floodlights for the Jubilee Celebrations in India are being made**

Messrs. Standard Switchgear, Ltd., of Hornchurch, Essex, have lately completed the reconstruction and reorganisation of their switchgear manufacturing business. Mr. J. B. Rudkin, A.M.I.E.E., the former managing director, has relinquished his connection with, and financial interest in, the company. The action of Rudkin *v.* Collis, which was reported in these pages last summer (Electrical Review, July 25th, 1934), has been settled out of Court. The company is now entirely under the control of Mr. A. G. Collis, M.I.E.E., and his two sons, Messrs. J. A. and C. G. Collis, who were appointed directors some time ago, and whose photographs appeared in our "Personal" pages on June 22nd last. The reorganisation has been followed by additions to the designing staff and additional capital has been found. The company has under construction some new designs of apparatus for high-frequency control at extra high voltages.

The address of the British depôt of Britannia Batteries, Ltd., has been changed as from March 1st to c/o L.M. & S. Railway Goods Agent, Panther Warehouse, Avon Street, Avon Side, Bristol.

## The South African Empire Exhibition

As was announced in our issue of January 18th, an Empire Exhibition is to be held in Johannesburg during the concluding months of 1936, and invitations to participate have now been sent to the various Governments of the British Commonwealth. Commercial exhibits from all parts of the Empire will be accepted. The exhibition will coincide with the Jubilee of Johannesburg. It will be on a comprehensive scale and of a scope and character comparable to the Wembley demonstration of 1924-25. The industrial sections will include heavy machinery, mining and engineering; light machinery and hardware; agricultural machinery and accessories; and household accessories.

## Progress in Electricity

Sir William Ray, M.P., executive chairman of E.D.A., addressed a joint gathering of the Athenæum Electrical Club and the Electrical Association for Women at Manchester last week on "The Progress of Electricity." He appealed to electrical engineers to make every effort in the housing schemes, which would replace slum areas on a large scale, to see that the houses were electrically planned from the start. He also made mention of the possibilities of electricity greatly reducing the number of road deaths by providing better lighting.

## A Refrigerator Sales Convention

The International Refrigerator Co., Ltd., held its second annual convention in London this week and about 260 members of the organisation and guests attended. Apart from introductory and concluding announcements by Mr. H. C. Timewell, general sales manager, there were twelve speeches, in which Mr. J. J. West, managing director, and members of the executive and general staffs of the concern unfolded the 1935 sales programmes. All the speeches were brief and to the point, and a few of them were delivered by guests. Sir Wm. Arbuthnot Lane, Bt., spoke enthusiastically in favour of refrigeration; he asserted that the refrigerator had done more for the health and happiness of the public than any other electrical equipment. Mr. V. Dale, E.D.A., urged a new outlook in advertising refrigeration, and suggested educating dealers to "sell health" not merely apparatus. Mr. L. C. Penwell, E.C.A., called on contractors to develop their sales side, emphasising the advantages of specialisation in one or a few commodities rather than endeavouring to cater for every branch of electrical trading. He urged them to provide credit facilities. The display of a film showing the manufacture of the B.T.H. refrigerator at Rugby was another well appreciated item of the programme, as was also the inspection of an exhibition of the company's products, which ranged from the recently introduced "Liftop" model on the domestic side to 500 cu. ft. or so commercial cold rooms.

## Fire Prevention in Power Stations

The "'Mulsifyre" system of fire prevention that has been developed by Messrs. Mather & Platt, Ltd., has now been applied to power station conditions by the London Power Co. at Battersea, Deptford West, and Grove Road. The principle employed is that of rendering oil non-inflammable by emulsification, under the mechanical agitation provided by jets of water issuing from special nozzles or "projectors," spaced a few feet apart. The formation of the emulsion at the surface of the oil is all that is found to be necessary: this condition is maintained for several minutes after the water has been turned off, thus preventing re-lighting, but within a few hours, it is claimed, there is complete separation of the water and oil without detriment to the latter. The water jet, being in the form of spray, is a non-conductor of electricity.

## British Plant for China

Orders for £200,000 worth of machine shop equipment will be placed with British firms as the result of the annual meeting of the Chinese Government's Purchasing Commission which was held at the Chinese Legation on February 25th. According to a *Reuter* message the report for 1934 shows that orders placed with British firms were substantially bigger than in 1933. The value of the year's contracts was £1,849,979, bringing the total value of orders since the Commission began work to £2,915,025. The total tonnage of materials shipped during the year was 89,437.

## The Birmingham Handbook

The improvement in industrial and financial conditions during the past year has had its effect on local government affairs, and in the ninth edition of the City of Birmingham Handbook special attention is given to various projected schemes of importance. Reference is made to the forthcoming Birmingham section of the British Industries Fair, and the usual information for visitors is given relating to car parking, and a list of hotels. Of particular electrical interest are sections describing the growth of the Corporation's electricity and transport undertakings.

## Proposed Approval Mark in Sweden

According to the Swedish journal *Era*, a proposal is under consideration by the Swedish Government to permit the use in that country of only electrical material bearing a Swedish mark of approved quality. The new order will apply to all material used in interior installations and to household electrical appliances, but not to material used in industrial installations.

## The British Industries Fair

The final attendance figures for the British Industries Fair, which closed in London last week, showed that 27,273 more people visited the Fair than last year. The figures are 188,156, as compared with 160,883 in 1934. The number of home buyers was 135,320, an increase of 20,981; of overseas buyers 11,713, a decrease of 295; and of the general public 41,123, an increase of 6,587. The apparent decrease in the number of overseas buyers, who attended the Fair from seventy-six countries, is explained by the fact that last year the Engineering and Hardware Section of the Fair was held at the same time as the Fair in London. This year it opens at Castle Bromwich on May 20th; it is therefore satisfactory that already the number of overseas buyers who have visited the Fair in London should very nearly have reached last year's total for the Fair as a whole.

## Prices of Materials

Messrs. F. Smith & Co. report, March 6th: Electrolytic copper bars, £32, £2 inc. Ditto, ditto, wire rods, £36, £1 15s. inc. Ditto, ditto, h.c. wire, 6½d. ⅝d. inc. Silicium bronze wire, 7⅞d., ½d. inc.

Messrs. Edward Till & Co. report, March 6th: No change in the price of India-rubber, Para fine.

Messrs. Henry Gardner & Co. report, March 6th: Copper bars (best selected), sheet and rod, £58, £2 inc.; English pig lead, £11 10s., 15s. dec.; Electrolytic copper sheets, £31 5s. to £31 12s. 6d.

## The "Exide" Convention

Delegates from many countries will attend the fifteenth annual "Exide" convention to be held from May 28th to 30th, at Eastbourne. The convention headquarters will be at the Grand Hotel, where the morning sessions devoted to business discussions will be held, and the convention will be opened with an address by the chairman, Mr. D. P. Dunne, managing director. An informal reception and dance will take place on May 27th, and on Tuesday, Wednesday and Thursday delegates will be entertained to luncheon by the company and to dinner on Tuesday and a banquet on Wednesday in the Winter Gardens. A number of other functions are being organised.

## New Hebrides Customs Tariff

The list of goods which are liable to Customs duties upon importation into the New Hebrides, which came into force on February 11th, includes electrical goods and wireless apparatus on which the rate of duty is 12 per cent. *ad valorem*.

**A window display at the showroom of Wolverhampton Corporation designed to draw attention to the reduced rate for electricity for cooking purposes**

## New Catalogues and Lists

**Schall & Son, Ltd.,** 75, New Cavendish Street, W.1.—A catalogue of infra-red and radiant heat apparatus.

**Benjamin Electric, Ltd.,** Brantwood Works, Tariff Road, Tottenham, N.17.—The first number of the new series of "The Reflector."

**British Insulated Cables, Ltd.,** Prescot.—A catalogue of telephone and telegraph line wire.

**Cambridge Instrument Co., Ltd.,** 45, Grosvenor Place, S.W.1.—A leaflet on $CO_2$ meters, &c.

**F. Thomas & Co., Ltd.,** 189, Drummond Street, N.W.1.—A catalogue of "Efteelite" fittings for commercial, industrial and hospital lighting.

**Sturtevant Engineering Co., Ltd.,** 147, Queen Victoria Street, E.C.4.—Two profusely illustrated catalogues on pneumatic dust-collecting and conveying systems and other products.

## Bankruptcy Proceedings

**R. C. Redeglia,** electric lamp dealer, 40, King William Street, E.C.—The receiving order in this case was made on February 14th upon the petition of N. O. Vereenigde Industrieer, Rotterdam, creditors, claiming £324 and on February 27th the statutory first meeting of creditors was held at London Bankruptcy Buildings. The debtor has lodged accounts showing total liabilities of £1,706 (unsecured £1,454), and assets of £123. He states that in 1924 he started as agent of French firms for the sale in this country of lamp-making machinery, tungsten wire, molybdenum wire and glass bulbs. Those agencies were transferred to his son in April, 1934. He (debtor) acted as a director of the Anti-Vibration Electric Lamp Co., Ltd., which took over the sole selling agency of electric lamps for the N.O. Vereenigde Industrieer, Rotterdam. The agreement expired in June, 1933, and litigation ensued. A receiver was appointed by the debenture holders of the Anti-Vibration Electric Lamp Co., Ltd., and he (debtor) was held liable under guarantees given on behalf of that company. He disputed liability, but was not in a position to fight a prolonged action and these bankruptcy proceedings were launched by the petitioning creditors. The case was left in the hands of the Official Receiver, who will apply in due course for an order of adjudication.

**C. F. Du Bock,** formerly trading as the Bright Electric Co., electric lamp distributors, Ridley Road, Forest Gate, E.—The debtor attended on February 27th at the London Bankruptcy Court for public examination upon accounts showing debts of £1,101 and assets of £21. Replying to Mr. Newman, Assistant Official Receiver, the debtor stated that he was employed in the Civil Service, and in August, 1933, he began business as above. He had no capital and relied on the promise of financial support from his suppliers, which support was withdrawn in June, 1934. His business consequently declined and ceased in the following August, these bankruptcy proceedings being instituted by a creditor. The debtor further attributed his failure to ill-health. The examination was concluded.

**W. A. Jolly,** trading as the Globe Equipment Co., 36, Foleshill Road, Coventry, dealer in wireless parts and accessories.—The receiving order herein was made recently on the debtor's own petition, when the statement of affairs filed showed ranking liabilities of £306, with net assets of £79 and a deficiency of £227. He attributes his failure to bad trade and ill-health.

**W. J. Richardson,** 14, Highthorne Avenue, Bradford Moor, Bradford, wireless dealer.—This debtor's public examination was held on February 26th at the County Court, Bradford. According to the statement of affairs there were liabilities of £131, and a deficiency of £112. Debtor said his failure was due to lack of capital and business inexperience. The examination was concluded.

**E. G. Williams,** 37, High Street, Brownhills, nr. Walsall, wireless and electrical dealer.—The public examination herein was held on February 28th at the Court House, Walsall, when the debtor attributed his failure to insufficient capital, insufficient profit to meet expenses, bad trade and inexperience. The liabilities amounted to £753, with a deficiency of £553.

**W. E. Magson,** electrical engineer, 54, Vyner Street, York.—Last day for receiving proofs for dividend March 13th. Trustee, Mr. J. S. Snowball, Bank Chambers, Scarborough, Official Receiver.

**J. H. Withycombe,** electrical engineer and wireless dealer, 61, High Street, Barnstaple.—First and final dividend of 2s. 11¼d. in the £, payable March 12th at The Strand, Barnstaple.

**R. D. Cooper,** wireless engineer, 5, Cambridge Terrace, Heighington, Co. Durham.—Receiving order made February 27th on debtor's own petition.

**W. Handley** and **G. Taylor** (Handley & Morgan), wireless dealers, 55, Lower Union Street, Bristol (separate application of G. Taylor).—Application for discharge to be heard on March 21st at the Guildhall, Bristol.

**A. W. Tack** (Ensbury Electrical Supplies), electrical and radio retailer, 119, Columbia Road, Bournemouth.—Trustee, Mr. C. J. Pyke, 10, Rockstone Place, Southampton, Official Receiver, released February 21st.

**A. J. Harding,** electrical engineer, 50-51, Broad Street, Hereford.—Trustee, Mr. O. B. Wallis, 133, St. Owen Street, Hereford, Official Receiver, released February 21st.

**M. Glanfield** (Broadway Radio), 7, Broadway, London Road, Portsmouth.—Trustee, Mr. C. J. Pyke, 87, High Street, Portsmouth, Official Receiver, released February 21st.

**E. H. Jones,** electrician and radio dealer, Northcote Buildings, Undercliffe, Bradford.—Last day for receiving proofs for dividend March 19th. Trustee, Mr. J. O. Morris, 71, Manningham Lane, Bradford, Official Receiver.

**H. D. Smith** (Standard Radio and Electrical Co.), 4a, Alpha Road, Surbiton.—Last day for receiving proofs for dividend March 18th. Trustee, Mr. C. Latham, 78, New Oxford Street, W.C.

**H. C. Vanson,** electrical engineer, 35, Pasture Road, Goole.—Last day for receiving proofs for dividend March 16th. Trustee, Mr. B. S. Briggs, 13, Burton Street, Wakefield, Official Receiver.

**A. J. Barks** and **H. Barks** (Barks Bros.), electrical and radio engineers, 10, St. Martin's Lane, Lincoln.—First and final dividend of 2s. 11d. in the £, payable March 5th at 1, St. Swithin's, Lincoln.

## Company Liquidations

**R. Brightwell, Ltd.,** lighting engineers, 107, Queen's Road, Bayswater, W.2.—At a recent meeting of creditors a statement of affairs was presented showing ranking liabilities of £2,316 and net assets of £835, leaving a deficiency of £1,481 so far as the creditors were concerned. The deficiency was attributed to losses on trading, depreciation written off the assets, and the elimination of the goodwill (£1,551). It was reported that the company was registered in August, 1927, taking over the old-established connection of Mr. R. Brightwell. The nominal capital was £7,000, of which £6,132 had been issued and was fully paid. Shares to the value of £580 were subscribed for in cash, and the remainder were allotted to the vendor in consideration of the assets transferred. For some time past the company had carried on business at a loss, and there had been a falling-off in the turnover. The creditors confirmed the voluntary liquidation of the company with Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, London, E.C., as liquidator. A committee was also appointed consisting of the representatives of Messrs. Falk, Stadelmann & Co., Ltd., the General Electric Co., Ltd., and E. Marshall, Ltd. The following are the principal creditors:—Falk, Stadelmann & Co., Ltd., £167; General Electric Co., Ltd., £385; Gibbon & Moore, £256; E. Marshall, Ltd., £163; Sun Electrical Co., Ltd., £180.

**Fort Radio, Ltd.,** 407, Lordship Lane, Tottenham, N.17, electrical dealers, &c.—The creditors met on March 4th in London. A statement of affairs had previously been circulated which showed assets estimated at £278, subject to preferential claims of £2 and debentures of £500. There was a deficiency as regarded the debentures holders of £224, and there were no assets available for the unsecured creditors. The ranking liabilities were set down at £2,000, with a deficiency of the same amount. As regarded the shareholders, there was a deficiency of £2,007. Mr. F. W. Inns, accountant and auditor, stated that he was appointed to act as receiver for the debenture holders on February 19th last. It was reported that the shareholders had passed a resolution for voluntary liquidation with Mr. F. W. Inns as liquidator. The company was registered in June, 1932, with a nominal capital of £500, of which £7 was issued for cash. In August, 1933, Mrs. E. E. Langbart advanced the company £500 on the security of a debenture. Mr. Inns said it was obvious that the debenture holder could not be paid in full. The premises had been closed and the assets would be realised by auction or private treaty. No resolution was passed and the voluntary liquidation will therefore be continued by Mr. Inns.

**Ferryside Electric Supply Co., Ltd.**—Winding up voluntarily. Liquidator, Mr. T. Penman, 66, Queen Street, E.C.

**Radio Electric Lamp Co., Ltd.**—Meetings March 29th at Clayton Road, Hayes, Mddx., to receive an account of the winding-up of the liquidator, Mr. J. E. Wright.

**Betta Electric Motors, Ltd.**—Meeting April 2nd at 44, Bedford Row, W.C., to receive an account of the winding-up by the liquidator, Mr. P. E. Slack.

## Dissolutions of Partnership

**Huggins & Powick,** electrical engineers, 7, Stroud Road, Gloucester.—Messrs. R. D. Huggins and E. F. Powick have dissolved partnership. Mr. Huggins will attend to debts and carry on the business under his own name.

**Myles & McCaffery,** electrical engineers and contractors, 5, Dickson Road, Blackpool.—Messrs. T. Ramsden and C. B. Moore have dissolved partnership by mutual consent as from February 28th.

# Electricity Supply

## Lighting, Domestic, Power

**Aberdare.**—MANY COOKERS INSTALLED.—We are informed by Mr. W. E. Richardson, general manager of the electricity undertaking, that during the first six weeks that the electricity showroom had been open (up to the end of February) orders for over a hundred cookers were received. The rate for cooking has recently been reduced from 1¼d. to ¾d. per kWh. In Aberdare 11,130 of the 11,237 inhabited houses are connected to the mains.

**Aberdeen.**—ADDITIONAL PLANT.—The Electricity Committee recommends that the 500-kW sub-station plant at Maberly Street shall be replaced by plant of 1,000 kW, and that the 500-kW plant in Jamieson's Quay shall be rebuilt.

**Barking.**—BECONTREE ELECTRIFICATION.—Two sites are being acquired by the Electricity Committee on the L.C.C. Becontree Estate for the erection of sub-stations. Electrical services are to be installed in a number of houses.

SUB-STATION EQUIPMENT.—Tenders are being obtained for equipment for a sub-station at Wykeham Green.

**Basingstoke.**—LOANS.—For various mains extensions, &c., the Town Council has applied for loans amounting to £4,150.

**Biddenden.**—A SUPPLY PROMISED.—The Weald Electricity Supply Co., Ltd., has informed the Tenterden Rural District Council of its intention to extend its mains to the village forthwith.

**Birkenhead.**—NEW PLANT.—Several sub-stations are fully loaded and it will be necessary to install further plant soon; tenders are to be invited.

ELECTRIC LIGHTING.—The Electricity Committee is to substitute electric for gas lighting in Old Chester Road (£910).

**Bognor Regis.**—REVISED CHARGES.—The Bognor Regis Gas & Electricity Co. has revised its charges for the Arundel area as follows: Lighting, 6d. per kWh; heating and cooking, 1d.; power, 1½d.; domestic supplies, fixed payment of from £2 per annum (under 800 sq. ft. floor area) with a "unit" charge of ¾d.; business premises, £16 per annum per kilowatt of maximum lighting demand and ¾d. per kWh for all energy, or, alternatively, 1d. per kWh for lighting.

**Bradford.**—NEW £50,000 SUB-STATION.—The construction of a sub-station at Thornbury at a cost of £50,000 has been recommended by the Electricity Committee.

**Brighton.**—ELECTRIC COOKERS.—The Electricity Committee is to provide electric cookers for forty-eight Council flats on the Woburn Place site.

LOANS FOR NEW PLANT.—Sanction has been obtained to a loan of £74,075 for generating and steam-raising plant, and application is to be made for permission to borrow £20,000 for sub-station equipment.

**Bristol.**—SUB-STATIONS.—The Electricity Department is to erect eight new sub-stations.

**Cheltenham.**—WORK SCHEMES.—A third feeder cable is to be laid from Hester's Way sub-station to Rowanfield Road sub-station (£3,588). The Electricity Committee also proposes to provide additional cables, switchgear, and transformers and to erect three new sub-stations in the Pittville, All Saints, Gloucester Road and Lower High Street districts (£5,750).

**Chichester.**—BULK SUPPLY CHARGES.—The City Council has approved a recommendation that the bulk supply price of electricity as from January 1st (the date from which Portsmouth Electricity Department took a supply from the Central Electricity Board) should be fixed provisionally at £3 17s. 6d. per kW of maximum demand, plus ¼d. per kWh, subject to coal clause. The charge to Bognor Regis has been fixed provisionally at £4 2s. 6d. per kWh, plus 0.3d. per kWh, subject to coal clause, the charges to be adjusted when the actual cost to the Corporation can be ascertained.

WITTERING SCHEME APPROVED.—The Electricity Commissioners have approved the scheme for extending the electricity supply to Wittering.

**Clydebank.**—ELECTRICAL DOCK PLANT.—Motor generators are to replace the thirty-year-old steam plant at Rothesay Dock, Clydebank, for driving electric cranes and coal hoists. The system will consist of three 450-h.p. Crompton motors driving three flywheel generators.

**Colwyn Bay.**—CANVASS.—The Town Council has authorised a canvass of part of Llanelian, which is to be added to the borough, to ascertain the probable demand for electricity.

**Darlington.**—LOWER CHARGES.—Following an increase of 5,200,000 kWh in the electricity sold during 1934 the Electricity Committee recommends a reduction of 10 per cent. in all electricity charges for the current quarter, which will leave an estimated surplus profit of £4,800.

**Dunoon.**—NEW PLANT.—Additional machinery is being installed at the works of the Dunoon & District Electricity Supply Co., Ltd., in Hamilton Street to meet the increasing demand for electricity. The number of consumers at the end of last year was almost double that at the end of 1933.

**Eastbourne.**—ROYAL RESIDENCE.—Among the alterations that have been carried out at Compton Place, where the King and Queen are now in residence, has been the complete overhaul of the electrical system and its conversion to 200 V (previously 100 V) to allow for an extensive use of electric fires. A new sub-station has been installed in the cellar of the house.

CENTRAL SUB-STATION.—An installation of ventilating equipment on up-to-date lines has just been completed at the central sub-station to reduce the air temperature in consequence of the additional plant installed. This underground sub-station is, we believe, one of the largest of its kind on the south coast. The present installation comprises four 1,000-kVA transformers and two 300-kVA transformers and ancillary gear, and the ventilation equipment is required to reduce the inside air temperature to within 20 deg. F. of the outside air temperature. This gear was installed and supplied by Messrs. Davidson & Co., Ltd.

MAINS.—The Electricity Committee recommends the replacement of small mains in eleven roads (£2,978); an expenditure of £5,260 in providing supplies to houses to be erected as the Cherry Tree Garden estate; and £965 for the mains necessary for the new Beachlands estate, Pevensey Bay. Other recommendations include a short extension to High Street, Pevensey (£120), and seven street-lighting extensions (£129).

**Elgin.**—SALE OF UNDERTAKING.—The Elgin Electric Supply Co., Ltd., has accepted the Scottish Power Co.'s offer to purchase the undertaking.

**Epsom.**—CHEAPER POWER.—The Urban District Council has reduced the charge to large power consumers for the first 20,000 kWh from 1¼d. to 1d.

LOAN.—Application has been made for a loan of £3,750 for completing the h.v. ring main from the Langley Vale kiosk to the electricity works.

**Galloway.**—LOCH DOON DAM.—The Galloway Water Power Co., which is carrying out the electrification of South Scotland, received tenders in London on February 27th for the construction of the Loch Doon dam.

**Guildford.**—SUPPLY TO NEW ESTATE.—Extensions are to be carried out to supply 130 houses at Bannisters Farm (£610).

ASSISTED WIRING.—The Electricity Committee is seeking sanction to borrow £5,000 for its assisted-wiring scheme.

**Hebden Bridge.**—LOAN FOR COOKERS.—The Urban District Council seeks sanction to a loan of £1,000 for electric cookers.

**Inverness.**—INQUIRY RESULT.—The application of the Town Council for permission to install an additional 2,000-kW turbo-alternator (which was the subject of a public inquiry last October) has not been allowed by the Electricity Commissioners, who suggest that the Council should reopen negotiations with the Grampian Electricity Supply Co. for a partial bulk supply to meet the additional needs of the burgh. The Electricity Committee is to make further representations.

**Lichfield.**—LOAN.—The City Council has applied for a loan of £6,500 for electricity purposes.

**Liverpool.**—NEW SUPPLY AREAS.—The Corporation has obtained authority to supply electricity to Altcar and Downholland. There was opposition by the Lancashire Electric Power Co., which made a counter-application.

**London.**—HACKNEY.—A special tariff of 0.33d. to 0.3d. per kWh has been approved by the Electricity Committee for small thermal-storage installations where the supply is used only from 8.30 p.m. to 8 a.m. The consumption is to be separately metered and controlled by a time switch, for which a rental of 5s. per quarter will be charged.

Application is being made by the Electricity Committee for sanction to a loan of £20,000 for service lines to consumers' premises.

HAMPSTEAD.—The Council has decided to reduce the charges for electricity for lighting from 3d. to 2½d. per kWh, and for power, heating and cooking from 0.6d. to ½d. per kWh, following the March meter readings. In addition, 20 to 30 per cent. reductions are being made in hire charges for apparatus. Mr. J. Leadbeater, the borough electrical engineer and manager, informs us that the estimated saving to consumers in 1935-36 will be approximately £30,000.

POPLAR.—The Electricity Committee has received sanction to loans of £3,900 for switchgear for the Glaucus Street station, and £14,000 for a turbo-alternator set, and desires to borrow £10,437 for meters and £1,000 for the provision of a meter department in the proposed new Town Hall at Bow Road.

**Luton.**—STREET LIGHTING.—Work is being put in hand on the lighting of Chaul End Lane by centrally suspended lamps (£1,334).

**Maidstone.**—HOSPITAL INSTALLATION.—It is proposed to install electric lighting at the Medway Hospital at a cost of £1,000, including mains extensions.

**Manchester.**—EXPENDITURE DURING 1935-36.—The Electricity Committee budgets for an expenditure of £595,500 on capital account during the year 1935-36, including generating stations, land, buildings, machinery, &c., £226,000; transforming stations, stores, depots, &c., £70,000; mains and services, £292,000; and street lighting, £7,500.

**Marlborough.**—CHEAPER ELECTRICITY.—The Town Council has reduced the lighting charge from 7½d. to 7d. per kWh.

**Melbourn (Cambs).**—COUNCIL HOUSE INSTALLATIONS.—The Rural District Council has decided that where more than half

the number of tenants of Council houses on a particular estate desire electricity to be installed the whole of the houses shall be wired, a charge of 2d. per week being made.

**Morecambe.**—IMPROVED METERS.—Following tests with a meter which takes the rateable-value charge and/or quarterly hire-purchase charges, and the standard charge per kWh, the Electricity Committee has approved the purchase of twelve meters of this type.

**Perth.**—HARBOUR LIGHTING.—The Harbour is now electrically lighted. The 200-W lamps used enable vessels to be loaded and unloaded at night, which was not possible with the former gas lighting.

**Peterborough.**—ELECTRIC-DISCHARGE LAMPS.—A street-lighting scheme employing electric-discharge lamps and costing £2,022 has been prepared for Park Road, part of Dogsthorpe Road, Broadway and Eastfield.

**Plymouth.** — CABLE EXTENSIONS. — Mains extensions in thirteen streets and roads in the city have been authorised by the Electricity Committee.

**South Africa.**—NEW SCHEMES.—Krugersdorp Town Council has been given power to raise a loan of £139,500, which includes £37,500 for an electricity scheme and £2,500 for lighting. Mr. G. V. Adendorff, consulting engineer, Cape Town, has been selected by Lichtenburg Town Council to draw up specifications and to advise generally in connection with a new electricity supply scheme. He recommends an expenditure of £9,500 on a power house.

**Southend-on-Sea.**—PIER ILLUMINATIONS.—The whole length of the pier is to be illuminated at a cost of £4,000.

**Southport.**—ILLUMINATIONS.—Decorative illuminations are being provided at the sea-bathing lake.

**Stoke-on-Trent.**—TRANSFORMER.—A 400-kVA transformer is to be installed at the Electricity Department's Boving substation, Fenton (£975).

SUPPLY TO 204 HOUSES.—The Electricity Committee is to provide a supply at a cost of £1,400 to 204 houses which are to be erected at Hunterscroft, Penkhull.

**Stone (Staffs).**—SUPPLY EXTENSIONS.—The Electricity Committee has offered a supply of energy to Trentham Gardens, subject to the estate authorities paying £2,000 during the next five years, and is applying for sanction to loans for extensions as follows: £550 (Oulton Heath); £2,500 (Aston and Little Stoke); and £1,500 (Safety Glass Works).

**Sturry and Fordwich.**—NEW SUPPLY.—The South-East Kent Electric Power Co., Ltd., has provided a supply to the district.

**Tredegar (Mon).**—RAPID DEVELOPMENT.—Although it has been in operation only one month, the new electricity scheme has reached a point of development that was anticipated would not be attained until 1938. The Council has therefore been negotiating with the Electricity Commissioners regarding the carrying out of further work when necessary.

**Uttoxeter.**—CONSENT TO SUPPLY PROPOSAL.—The Rural District Council has consented to the Urban District Council erecting overhead lines to supply electricity to Barrow Hill, Rocester, and Bramshall.

**Wellingborough.**—ELECTRICITY FOR COUNCIL HOUSES.—Electricity is to be installed in 306 Council houses shortly to be erected on the Doddington Road estate. The tender of the Wellingborough Electric Supply Co. has been accepted.

SUB-STATION.—The Wellingborough Electric Supply Co., Ltd., is to erect a sub-station at Doddington Road.

**Wick.**—PROFIT OR DEFICIT?—In a report of Mr. J. N. Atkinson, manager of the electricity undertaking, which was considered at a recent meeting of the Town Council, various criticisms were made regarding the allocation of finances, and figures were quoted to show that accumulated deficits on the undertaking amounted to £4,290. The burgh chamberlain described the report, so far as it related to his department, as a reflection on himself and his department. He said the allocations as received by him were in perfect order, and he gave figures showing an accumulated trading profit of £3,815. The report was not accepted so far as it concerned the Burgh Chamberlain's Department.

**Wickham (Hants).**—MAINS EXTENSIONS.—Mains are to be extended in Southwick Road to the Warsash estate and to World's End.

**Wimbledon.**—REDUCED CHARGES.—Mr. A. E. McKenzie, chief engineer and manager of the Corporation Electricity Department, informs us of the following reductions in charges: Lighting, formerly 3d. per kWh, now 3d. per kWh for the first 500 kWh, 2½d. for the next 10,000, and 2d. thereafter; two-part tariff, ¼d. per kWh instead of ½d.; slot-meter supply (lighting), formerly 5d., now 4d. per kWh; maximum-demand system (as from October 1st, 1935), point rental (winter) to be reduced from 2d. to 1½d. per week; winter lighting charge to be reduced from 2½d. to 2d. per 20 W per week.

**Wrexham.**—NEW MAINS.—Cables are to be laid along portions of Grosvenor Road, King Street, Holt Road, Fairy Road and Pentrefelin (£2,314).

**Wyke (Surrey).**—EXTENSIONS.—The Mid-Southern Utility Co. is to extend its overhead lines from St. Mary's Church to Pirbright Road, Normandy.

**York.**—ELECTRICITY FOR NEW HOUSES.—The Housing Committee has decided that new houses on the Water Lane estate shall be fitted for the use of electricity for cooking and heating.

ELECTRIC HEATING.—Electric heating apparatus is to be installed in the State Room of the Mansion House.

MAINS AND SUB-STATIONS.—The Electricity Committee is seeking sanction to borrow £18,000 for mains extensions and sub-stations.

# The Jubilee Illuminations

WE mentioned a few weeks ago that E.D.A. was seeking the assistance of electricity supply undertakings in raising funds for illumination schemes in connection with the Royal Jubilee in May. A letter has been sent to undertakings in the County of London pointing out the desirability of floodlighting some of London's public buildings during the period and suggesting that such installations should be permanent ones so that they could be employed on future occasions. The Association says that it understands that H.M. Office of Works is willing to accept the responsibility for the maintenance of such installations but could not agree to pay for their provision. It is suggested that on this occasion permanent installations should be set up in connection with Buckingham Palace, Big Ben Tower, Horse Guards Parade, and the National Gallery, and the Association is prepared to guarantee the payment of the entire cost if the groups interested in the electrical industry will bear about one-third each, *i.e.*, about £2,000. Already about £3,900 in money and in kind has been promised by supply companies and manufacturers' associations, and it is anticipated that the municipal authorities owning undertakings will also contribute on the basis of an amount equivalent to their subscription to the Association, but in any case not exceeding £100. It is acknowledged that permanent floodlighting installations will be a good advertising scheme for the electrical industry in London, and being of a permanent nature will always be available to Londoners.

In response to this letter the Hammersmith Electricity Committee has recommended that a contribution of £100 should be made.

The Electrical Development Association is arranging to produce a special Silver Jubilee booklet and is also preparing window displays, details of which will appear later in the Sales and Publicity programme.

The London County Council has approved a maintenance estimate of £450 in respect of the permanent installation of floodlighting apparatus for the crescent of County Hall on the river front. It has now given consideration to the question of further floodlighting of the river front and proposes that, in addition to the permanent installation for the crescent, apparatus for floodlighting the four pavilions on the river front of the building shall be installed permanently, and that during the celebrations the two flat faces of the building between the pairs of pavilions on each side of the crescent shall also be floodlighted, but with temporary installations. The total cost will not exceed £1,150. It is understood that Broadcasting House will be floodlighted. The Keighley Electricity Committee recommends that public buildings shall be floodlighted and coloured street illuminations provided during the Jubilee period. It is proposed to supply electricity at ½d. per kWh for special lighting purposes.

At Birmingham the Electric Supply Committee has decided to floodlight public buildings. A fountain in Chamberlain Square will be illuminated in colour. The installation will be retained and utilised again from May 20th for the period of the British Industries Fair at Castle Bromwich. The Southport Electricity Committee has decided to connect temporary illuminations for the Jubilee celebrations without charge, and to fix a price of ½d. per kWh for such supplies during one month from the first day of the celebrations. Buildings are to be floodlighted and fairy lamps placed in the main streets of Oxford at an estimated cost of £800, no charge being made for the supply. The Electricity Committee recommends that a special charge of 1d. per kWh shall be made for electricity used generally for floodlighting and illuminations. It is proposed to floodlight the large figure of Vulcan which surmounts Sheffield Town Hall. Wolverhampton Council is to arrange for the erection of 10,000 coloured lights to decorate the streets.

The Blackburn Electricity Committee is spending £450 on floodlighting and illuminations. As an inducement to private consumers electricity is to be supplied at a flat rate of ½d. per kWh, plus a charge of 7s. 6d. for fixing meter. Mr. G. H. Lake, the city electrical engineer of Nottingham, informs us that his Committee has decided to charge 1d. per kWh for outside illuminations from April 29th until the close of the Nottingham and Notts Historical Pageant (June 10th to 15th). In connection with the celebrations at Warrington the Town Hall and Warrington Bridge are to be floodlighted, and there will be a specially illuminated tramcar.

The Finchley Electricity Committee recommends an expenditure of £500 on the illuminations, while at Bognor Regis there will be strip lighting and floodlighting as well as illuminated pylons at the urban boundaries. Floodlighting of buildings and an illuminated tramcar will be features of Cardiff's celebrations.

# Traction

**Darlington.**—PROTECTION FOR TROLLEY-BUS SERVICES.—The United Automobile Services, Ltd., has agreed that on all routes covered by the Corporation trolley-buses it will make the single fare by buses one penny greater than the single trolley-bus fare, and will not issue contract tickets entitling holders to be picked up or set down within the borough boundary in competition with the trolley-buses. These conditions will also apply to any other routes which may in the future be operated by trolley-buses.

**France.**—PARIS METRO. EXTENSION.—Work on the Chatelet to Belleville line of the Paris Metropolitan Railway is now almost completed, and a passenger service will be inaugurated within the next few weeks. This is the deepest of the Paris lines, some parts being 150 ft. below street level.

**Germany.**—ELECTRIFYING THE RAILWAYS.—Herr Kleinmann, director of the German State Railways, is reported to have stated that efforts will be made to convert further lines to electric traction, especially the Munich route to Rome.

**Hungary.**—ELECTRIFICATION COMPLETED.—The whole of the main line between Budapest and Hegyeshalom, on the Austrian frontier, is now operated electrically, the Kando single-phase system being used. The first 64 miles to Komarom were opened in 1932, and over the last 60 miles electric operation has been introduced gradually during the last few months.

**India.**—BOMBAY SUBURBAN EXTENSION.—The Government of India Standing Finance Committee for Railways has approved the scheme of the Bombay, Baroda and Central India Railway for the extension of its Bombay electric suburban system from Borivli to Virar. Without any increase in traffic, this electrification is expected to save Rs.1.21 lakhs compared with the cost of steam operation.

**Nottingham.**—NO TROLLEY-BUS SERVICE FOR ARNOLD.—The City Council is to withdraw from the Bill now before Parliament the clause seeking powers to operate a trolley-bus service from the city to Arnold.

**Poland.**—WARSAW.—The suburban railway company, 95 per cent. of the shares of which are held by the Belgian Société des Tramways Suburbanes de Varsovie, is reported to have decided to proceed with the electrification of its lines, four of which have a total length of 110 miles. Eighty motor coaches have been ordered in England and a similar number in Poland.

**South Africa.**—RAILWAY ELECTRIFICATION.—An electric passenger service was introduced last month on the Durban-Orange Free State main line between Daimana and Harrismith, a distance of 60 miles. The junction with the existing Natal electrified system is at Daimana, near Ladysmith. The 88-kV transmission line is erected on the same masts as are used for the 3,000-V overhead contact wires. There are two sub-stations, each equipped with three mercury-arc rectifiers. No new locomotives have been built, and all the constructional and erection work has been carried out by the South African Government Railways, at a cost of about £185,000.

Mr. Pirow, Minister of Railways, states that a report that arrangements had been completed for the electrification of the line from Randfontein to Springs is premature. It is understood that the report of the departmental commission is quite favourable to electrification, but that the financial details are not yet settled.

**United States.**—NEW YORK-WASHINGTON ELECTRIC SERVICE.—The first through electric train to be operated by the Pennsylvania Railroad between New York and Washington has been put into service, states *Reuter's Trade Service* (New York). The train made the run of 227 miles in 4 hr. 15 min. (the schedule for the original steam trains), but when electric locomotives are in general operation in a month or so on this route it is expected that the running time for the train will be reduced to 3½ hr.

THE "FLYING YANKEE."—Another super-speed Diesel-electric train, the "Flying Yankee," has just been acquired by the Boston & Maine Railroad for a 60-m.p.h. service between Boston, Portland and Bangor. It is a three-car unit with a 660-b.h.p. engine and two traction motors. The stainless-steel body was built up by electric welding, and the train is equipped with electrically operated air-conditioning plant.

# Communications

**Australia.**—WIRELESS LISTENERS.—During 1934 the number of wireless receiving licences in force in Australia increased from 518,000 to 675,000.

TELEPHONES IN VICTORIA.—At December 31st the number of telephone subscribers in Victoria was 118,116, an increase of 1,109, and 163,467 instruments were in use (8,955 more than at the end of 1933).

**Bangor.**—BROADCASTING STUDIOS.—The B.B.C. has decided to open the new North Wales broadcasting studio at Bangor in June. It is expected that a relay station to serve North Wales will be built later.

**European Broadcasting.**—THE INTERNATIONAL BROADCASTING UNION.—The winter meeting of the International Broadcasting Union at Geneva, under the presidency of Sir Charles Carpendale (Great Britain), has just concluded. Representatives from nineteen national broadcasting services attended. The technical committee discussed, among other things, the improvement of telephone circuits used for national and international relays; the elimination of electrical interference prejudicial to good reception; and the different ways of guarding against inter-station interference. The application of the Lucerne plan during the winter period was the subject of rigorous technical examination, and it was agreed that experience had shown that the plan was more favourable to European listeners than previous arrangements. It was reported that the committee was embarking upon a study of the technical factors affecting broadcasting on short waves.

**Germany.**—TELEVISION.—The Reich broadcasting authorities have decided to open an experimental high-definition television service for the public in the second week in March. The broadcasting tower in Charlottenburg, just outside Berlin, will be used. Transmissions will be given three times a week for one and a half hours in the evening on wavelengths of 6.7 m. for vision and 6.98 m. for sound. The authorities will use 180-line definition, with 25 frames per second, as compared with the 240 lines recommended by the Selsdon Television Committee.

**Great Britain.**—TEST TRANSMISSIONS.—Test transmissions are being carried out at the Daventry Empire station from 2.30 to 3.30 a.m. on Sundays, Mondays, Wednesdays, and Fridays in order to determine the practicability of providing a service at the equivalent of evening hours in Western Canada, which is the only area in the Empire not already catered for. The transmissions are being made by GSL (49.1 m.; 6,110 kc/s) and GSC (31.32 m.; 9,580 kc/s).

RADIO INTERFERENCE.—During 1934 cases of extraneous electrical interference with radio reception investigated by the Post Office numbered 440 in the Bangor area, 344 in the Hanley area, and 295 in the Shrewsbury and Chester area.

**India.**—INCREASED TELEPHONE BUSINESS.—A marked increase has been recorded in trunk telephone calls in India, reports our Bombay Correspondent. The line between Bombay and Madras cannot cope with the traffic, and the carrier system of telephony is being installed. Plans for the extension of telephone and trunk line facilities during the present year, involving an expenditure of about Rs.5,000,000, are expected to be submitted to the Standing Finance Committee of the Legislative Assembly. The total number of telephones installed in India exceeds 60,000.

BEACONS FOR AIRCRAFT.—Tenders have been invited for the supply of equipment for night landing, including beacons, throughout the trans-Indian air routes. In several places it will be necessary to install a small generating plant to obtain the necessary power for the beacons.

**Japan.**—TELEPHONE TO EUROPE.—A direct radio-telephone service between Great Britain and Japan will be inaugurated next Tuesday. A direct service between Berlin and Tokio will also be opened this month.

**Middlesex.**—HOSPITAL SCHEMES.—The County Council is to extend the internal telephone system at the Central County Hospital at a cost of £220, and install radio apparatus at the Hillingdon Hospital (£315).

**Plymouth.**—EMERGENCY TELEPHONES.—As a result of Post Office research in conjunction with the police, the first loud-speaker telephone and beacon-light system was inaugurated on February 27th. This installation facilitates the making of calls for the fire brigade, the ambulance or the police. This is the first installation of its kind in the country.

**Calling the Fire Brigade at Plymouth**

**South Africa.**—TELEPHONE AND TELEGRAPH CONFERENCE.—The eighth annual conference of the South African Telephone and Telegraph Association has been held at Johannesburg. Mr. E. M. Dall, in his presidential address, showed how scientific knowledge and technical training had brought about the work of constructing and maintaining modern systems and apparatus of communication. He said that the carrier and voice-frequency telegraph systems were being extended and that soon there would be a network over the whole of South Africa.

# Contract Information

*When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below*

## Contracts Open

**Alfreton.**—March 12th. U.D.C. Electric pumping machinery in connection with the supplementary water supply from Lea Hall. Particulars from Elliott & Brown, engineers, Burton Buildings, Parliament Street, Nottingham (deposit £3 3s.).

**Australia.**—MELBOURNE.—Posts and Telegraphs Department. April 30th. Private automatic branch exchange telephone equipment. (A.Y. 12940.)*

State Electricity Commission of Victoria. April 8th. 22,000-V switchgear and accessories. (A.Y. 12947.)*

BRISBANE.—City Electric Light Co. May 14th. Oil immersed self-cooled outdoor type transformer. (A.Y. 12948.)*

**Barking.**—March 26th. County of London Electric Supply Co., Ltd. Steel frame buildings in connection with Barking power station extensions. (February 22nd.)

**Barnoldswick.**—March 18th. Electricity Department. P.i. cables during the year ending March 31st, 1936. (See this issue.)

**Beckenham.**—March 25th. Electricity Department. Meters for one year. (March 1st.)

**Bedford.**—Bedfordshire and Northamptonshire Joint Board for the Mentally Defective. Installation of electrical services at the Bromham House estate. (See this issue.)

**Blackpool.**—March 19th. Electricity Department. Meters for the year ending March 31st, 1936. (See this issue.)

**Bristol.**—March 13th. Electricity Department. E.h.p. and l.p. switchgear and e.h.p. transformer pillars. (March 1st.)

**Bury.**—March 18th. Electricity Committee. P.i. l.c. cables for twelve months commencing April 1st. (See this issue.)

**Cardiff.**—March 11th. R.D.C. Meters for the year ending March 31st, 1936. (February 22nd.)

March 13th. City Council. One electrically driven main sewage pumping unit at the Western District pumping station. Specifications, &c., from the city engineer, City Hall; tenders to the town clerk.

**Cheadle & Gatley.**—March 18th. Electricity Department. Extension to existing e.h.p. switchgear. (March 1st.)

**Chesterfield.**—March 14th. Electricity Department. One 500-kW glass-bulb rectifier equipment, e.h.p. and l.p. cables. (March 1st.)

**Cleethorpes.**—March 11th. Electricity Department. Electrical materials for the year ending March 31st, 1936. (March 1st.)

**Darlington.**—March 19th. Corporation. Trolley vehicles. (See this issue.)

**Dartford.**—March 23rd. Corporation. Switchgear extensions and glass-bulb rectifier extensions. (See this issue.)

**Doncaster.**—March 20th. Doncaster and Mexborough Joint Hospital Board. Re-wiring of the administrative and laundry blocks, Conisborough hospital. Specifications from the consulting engineer, Electricity Works, Station Road, Mexborough.

**Dundee.**—March 14th. Electricity Department. Three-core e.h.p. and multicore cable. (March 1st.)

**East and West Ardsley.**—March 16th. U.D.C. Electric lamps for twelve months ending March 31st, 1936. Particulars from F. A. Brown, Council Offices, Blackgate, Tingley; tenders to the clerk to the Council.

**Eastbourne.**—March 14th. Corporation. Electric lighting and heating installation and wiring work on the Grand Parade improvement scheme. (March 1st.)

**Edinburgh.**—March 14th. Electricity Supply Department. One year's supply of electrical materials. Specifications, &c., from the engineer and manager's office, Dewar Place; tenders to town clerk.

**Egypt.**—CAIRO.—April 20th. Ministry of the Interior. Electrical equipment for the extension of the distribution system at Minia. (A.Y. 12938.)*

**Epsom & Ewell.**—March 18th. Electricity Department. 11,000-V e.h.p. cable and eight-core pilot cable. (March 1st.)

**Gravesend.**—March 23rd. Borough Council. 400-kVA transformer. (See this issue.)

**Great Western Railway.**—April 4th. General stores. (See this issue.)

**Great Yarmouth.**—March 23rd. Electricity Supply Department. Stores and materials for the year ending March 31st, 1936. (March 1st.)

**Hastings.**—March 18th. Electricity Department. Cable supplies for the year ending March 31st, 1936. (February 22nd.)

March 21st. Electricity Department. Electric cookers for one year. (March 1st.)

**Horwich.**—March 16th. U.D.C. Materials and stores for the Electricity Department for the year commencing April 1st, 1935. Specifications, &c., from T. Green, surveyor, Public Hall; tenders to the clerk of the Council.

**Hove.**—March 23rd. Electricity Department. Materials for the year ending March 31st, 1936. (See this issue.)

**Ilford.**—March 22nd. Electricity Department. E.h.p. switchboard. (See this issue.)

**Keighley.**—March 14th. Electricity Committee. One year's supply of cables. Specifications, &c., from H. Webber, Electricity Offices, Coney Lane; tenders to the town clerk.

**Kilmarnock.**—March 21st. Town Council. Electric lamps for the year commencing May 16th. Particulars from the burgh surveyor, Market Bridge.

**Leyton.**—March 11th. Electricity Department. Cables for one year from April 1st next. (February 22nd.)

**London.**—HACKNEY.—March 27th. Electricity Department. Meters, demand indicators, cables and flexible cords. (February 22nd.)

**Manchester.**—March 21st. Electricity Committee. Twelve months' requirements of cables and service cut-outs. (March 1st.)

March 19th. Electricity Committee. 6,600-V and 33,000-V cable. (See this issue.)

**Middlesex.**—March 18th. County Education Authority. Electrical installation in school for girls. (February 22nd.)

**Morecambe & Heysham.**—March 18th. Electricity Department. Electrical materials for the year ending March 31st, 1936. (March 1st.)

**Newport (Mon.).**—March 25th. Electricity Department. 250-kW 3-phase rectifier equipment. (See this issue.)

**New Zealand.**—WELLINGTON.—Public Works Department. June 4th. 110-kV outdoor switchgear, steelwork, &c. (A.V. 12926.)*

June 18th. 110-kV and 50-kV insulating push-rods. (A.Y. 12927.)*

AUCKLAND.—May 28th. Harbour Board. Four electric semi-portal jib cranes and spares. Specification from C. R. Butters, 4/5, Wood Street, E.C.2 (deposit £2 2s.).

**Oswestry.**—March 16th. Electricity Department. Materials for the year ending March 31st, 1936. (March 1st.)

**Portsmouth.**—March 19th. Electricity Department. H.p. and l.p. switchgear and sub-station kiosks for the year ending March 31st, 1936. (See this issue.)

**Rhondda.**—March 18th. Electricity Department. Two 1,500-kW turbo-alternators and switchgear. (See this issue.)

March 29th. Meters, copper wire, joint boxes, &c., for the year ending March 31st, 1936. (February 22nd.)

**Salford.**—March 25th. Corporation. Mercury-arc rectifiers, transformers, switchboard and switchgear. (See this issue.)

**Sheffield.**—March 18th. Electricity Department. 450-kVA and 250-kVA three-phase transformers and 500-kVA Scott-connected sets. (See this issue.)

**South Africa.**—CAPE TOWN.—April 3rd. Electricity Department. Electrically driven sewage pumping plant. (G.Y. 14824.)*

**Southampton.**—March 19th. Electricity Department. Extensions of 6,600-V switchgear with reactors, &c. (March 1st.)

**Stoke-on-Trent.**—March 13th. Electrical Engineer's Department. Switchgear, transformers, cable, meters and motors for twelve months. (March 1st.)

**Wakefield.**—March 16th. West Riding Public Health and Housing Committee. Various works, including electrical, at the new maternity home, Wickersley. Specifications, &c., from the West Riding architect, County Hall; tenders to the clerk of the County Council.

**Walsall.**—March 16th. Walsall and West Bromwich (Barr Colony) Joint Board. Six months' supply of electrical fittings from April 1st. Particulars from the clerk and steward of the Institution, Great Barr Park Colony; tenders to the clerk to the Board.

**Watford.**—March 11th. Electricity Department. 6,600-V three-phase switchgear. (February 22nd.)

**Westhoughton.**—March 18th. U.D.C. Electric lamps for one year ending March 31st, 1936. Particulars from G. Hayes, surveyor; tenders to clerk of the Council.

**Willesden.**—March 13th. Electricity Department. Materials for the year ending March 31st, 1936. (March 1st.)

**Workington.**—March 18th. Electricity Department. Materials for the year ending March 31st, 1936. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed

**Barking.**—Health Committee. Recommended. Electrically operated pumping plant (£470).—Adams Hydraulics, Ltd.

Accepted. Electrical installation at hospital extension (£709).—Drake & Gorham, Ltd.

**Birkenhead.**—Electricity Committee. Accepted. Wiring under assisted scheme at seventy-four houses (£295).—Park Electric Co. Two outdoor transformers.—General Electric Co., Ltd.

**Cheltenham.**—Stores Committee. Accepted. Electric lighting fittings for twelve months.—Bence & Sons, Ltd.; Crompton Parkinson, Ltd.; Sharpe & Fisher.

**Durham.**—County Council. Accepted. X-ray equipment, with transformer, at the Holywood Hall sanatorium (£820).—Newton & Wright.

**Eastbourne.**—Electricity Committee. Accepted. For twelve months: Cable ducts.—Albion Clay Co. Street lamp standards and lanterns.—Revo Electric Co., Ltd. Street lamp brackets.—Electric Street Lighting Apparatus Co. Copper wire.—W. T. Henley's Telegraph Works Co., Ltd. Cables.—Standard Telephones & Cables, Ltd.; Craigpark Electric Cable Co., Ltd.; L. G. Ford, Ltd. Switchgear.—Ferguson, Pailin, Ltd. Meters.—Metropolitan-Vickers Electrical Co., Ltd.; Aron Electricity Meter, Ltd. Cooker control units.—M.K. Electric, Ltd. Overground disconnecting boxes.—W. Lucy & Co., Ltd. Cable slabs and tiles.—H.B. Concrete; H. J. Baldwin & Co.

**London.**—BATTERSEA.—Electricity Committee. Recommended. Two 500-kVA transformers (£502).—British Electric Trans-

former Co., Ltd. Public lighting standards (£441).—MacKenzie & Moncur, Ltd. Lamp hoisting gear (£71).—Engineering & Lighting Equipment Co., Ltd.

POPLAR.—Electricity Committee. Recommended. Coal-handling plant and storage at power station (£668).—Mitchell Conveyor Co., Ltd. Switchboard (£3,205).—Bertram Thomas.

**Newcastle-upon-Tyne.**—Transport and Electricity Committee. Recommended. Overhead equipment for the new trolley-bus route between Wallsend and Denton Burn (£19,625).—Clough, Smith & Co., Ltd.

**Northampton.**—Housing Committee. Accepted. Electric lighting installation at Council houses (£4,649).—C. Slack

**Oldbury.**—Education Committee. Accepted. Electric lighting at Bleakhouse school (£144).—Etna Lighting & Heating Co., Ltd.

**Salford.**—Light, Heat and Power Committee. Accepted. Oil-immersed outdoor transformer (£216).—Metropolitan-Vickers Electrical Co., Ltd.

Health Committee. Accepted. Mixing and mincing machine at Ladywell sanatorium and isolation hospital (£104).—Lancashire Dynamo & Crypto Ltd.

**Sheffield.**—Transport Committee. Accepted. Thirty tramcar trucks (£159 each).—Brush Electrical Engineering Co., Ltd. Sixty-two traction motors (£337 each).—Metropolitan-Vickers Electrical Co., Ltd.

**Todmorden.**—Education Committee. Accepted. Electrical work at open air school (£113).—Gatley & Co.

**Wallasey.**—Electricity Committee. Accepted. One 250-kVA transformer (£165).—Yorkshire Electric Transformer Co., Ltd.

# Forthcoming Events

**Birmingham Electric Club.**—Friday, March 8th. Grand Hotel, Birmingham. 7 p.m. Annual dinner.

**Royal Institution.**—Saturday, March 9th and 16th. Institution, London. 3 p.m. "Electromagnetic Radiations." Lord Rutherford.

**Electrical Power Engineers' Association** (*London Local Group*).—Monday, March 11th. Caxton Hall, S.W.1. 7.15 p.m. "The Trend of Modern Power Station Design." Mr. A. E. Farmer. (*Kent Section*).—Saturday, March 16th. Co-operative Hall, Gravesend. 6 for 6.30 p.m. Annual dinner.

**Illuminating Engineering Society.**—Tuesday, March 12th. Institution of Mechanical Engineers, S.W.1. 7 p.m. Joint meeting with the Royal Aëronautical Society. "Recent Developments in the Lighting of Aerodromes." Mr. H. N. Green.

**Institution of Engineers and Shipbuilders in Scotland.**—Tuesday, March 12th. Institution, Glasgow. 7.30 p.m. "A Diesel-Electric Paddle Ferry Boat." Mr. M. E. Denny.

**Electrodepositors' Technical Society.**—Wednesday, March 13th. Northampton Polytechnic Institute, E.C.1. 8.15 p.m. "Electrodeposition of Cadmium in Electrical Engineering." Mr. H. Marston.

**Institution of Electrical Engineers.**—Thursday, March 14th. Institution, London. 6 p.m. "The Engineer Administrator." Mr. E. S. Byng. (*London Students' Section*).—Friday, March 8th. Institution, London. 7 p.m. "High Voltage Alternators." Mr. P. E. Crawshaw Smith. Visit to the "Daily Herald" printing offices. 10 p.m. (*North-Eastern Students' Section*).—Friday, March 8th. County Hotel, Newcastle-upon-Tyne. 7.30 p.m. Annual dinner. Friday, March 15th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. "High Voltage Impulse Testing." Mr. F. M. Bruce. (*North Midland Centre*).—Friday, March 8th. Hotel Metropole, Leeds. 7 for 7.30 p.m. Annual dinner. (*Mersey and North Wales (Liverpool) Centre*).—Monday, March 11th. The University, Liverpool. 7 p.m. "Electrical Warming and Air Conditioning of Large Buildings." Messrs. R. Grierson and D. Betts. (*North-Eastern Centre*).—Monday, March 11th. Armstrong College, Newcastle-upon-Tyne. 7 p.m. "The Control of Voltage and Power Factor on Interconnected Systems." Mr. O. Howarth. (*South Midland Centre*).—Monday, March 11th. James Watt Memorial Institute, Birmingham. 7 p.m. "The Droitwich Broadcasting Station." Messrs. N. Ashbridge, H. Bishop and B. N. McLarty. Visit to the station. 3 p.m. (*North Midland Students' Section*).—Tuesday, March 12th. Corporation Electricity Department, Hull. 8 p.m. "Power Transformers." Mr. L. E. Southorn. Saturday, March 16th. Visit to Jowett Cars, Ltd., Idle. (*Scottish Centre*).—Tuesday, March 12th. Royal Technical College, Glasgow. 7.30 p.m. Joint meeting with the Students' Section. "A Cathode-Ray Oscillograph Equipment." Prof. S. Parker Smith, Dr. Ing, C. E. Szegho and E. Bradshaw. (*South Midland Students' Section*).—Tuesday, March 12th. James Watt Memorial Institute, Birmingham. 7 p.m. Joint meeting with the Rugby Engineering Society. "The Industrial Applications of Electron Tubes." Mr. A. L. Whiteley. Saturday, March 16th. Visit to the Pooley Hall Colliery Co., Ltd., Polesworth. (*Hampshire Sub-Centre*).—Wednesday, March 13th. Municipal College, Portsmouth. 7.30 p.m. "The Reception of Wireless Signals in Naval Ships." Mr. W. F. Rawlinson. (*Dundee Sub-Centre*).—Thursday, March 14th. University College, Dundee. 7.30 p.m. "Glass-Bulb Mercury-Arc Rectifiers." Mr. A. M. Browne. (*North-Western Students' Section*).—Thursday, March 14th. Visit to the Agecroft Power Station, Salford. (*Meter and Instrument Section*).—Friday, March 15th. Institution, London. 7 p.m. Informal meeting. Papers on transformers and meters will be discussed.

**Batti-Wallahs' Society.**—Friday, March 15th. Hotel Metropole, W.C.2. Annual dinner and dance.

**Electrical Contractors' Association** (*Bradford Branch*).—Friday, March 15th, Great Northern Victoria Hotel, Bradford. Annual dinner.

**Association of Mining Electrical Engineers.**—Saturday, March 16th. 2.30 p.m. Joint visit with the Kent Sub-Branch to the Laboratory of the General Electric Co., North Wembley. This is to take the place of the visit mentioned in our last issue, which has been cancelled. (*South Wales Branch*).—Saturday, March 9th. South Wales Institute of Engineers, Cardiff. 6 p.m. "Carbon Brushes and Their Application to Electrical Machines." Mr. H. B. Hedgecox.

# Notes

## I.E.E. Students' Dinner

The twenty-eighth annual dinner of the London Students' Section of the Institution of Electrical Engineers was held at the Florence Restaurant, W., on February 27th, when Mr. E. L. Hefferman, chairman, presided over a gathering of seventy-five members and guests. The toast of "The Institution" was proposed by Mr. W. E. Butler (hon. sec.), who referred to the beneficial effect of the Young Sports Trophy, which was displayed on the table, in bringing together the younger members of the three great engineering bodies, who had so many fundamental problems in common.

Mr. H. T. Young (vice-president) responding, said that the I.E.E., which was the largest engineering institution in the world, would have 16,000 members enrolled before the end of the present session. The total number of students and graduates was now 6,200. They received very good value for their subscriptions—tangible evidence of which was provided by the *Students' Journal*. The Royal Jubilee will be worthily celebrated by the Institution and it was proposed to clean up and floodlight the exterior of the building for the occasion. In proposing and responding to the toast of "The Guests," both Messrs. H. G. Edwards and A. L. Somerville (hon. sec., Association of London Students, Inst.C.E.), evidently believed brevity to be the soul of wit. "The Students' Section" was proposed by Mr. F. C. Harris in the absence of Mr. J. H. Reyner, through indisposition. Mr. Reyner's delving into the past had brought to light that Sir George Hume, M.P., had been chairman of the section in 1887; four other past chairmen had recently become presidents of the I.E.E.—Lt.-Col. K. Edgcumbe, Capt. J. M. Donaldson, Prof. E. W. Marchant, and Mr. P. V. Hunter. The progress of the provincial students' section during the past few years had been most remarkable. In his reply Mr. E. L. Hefferman suggested that the sporting contests between the three engineering institutions should be added to by including rowing; those interested should communicate with Mr. Powditch.

There were dramatic monologues by Mr. J. Corthesy (I.E.E. Librarian), which have now become a regular and acceptable feature of this annual function, and community singing was arranged by Mr. T. G. Martin.

## Chemical Engineering Congress

The Chemical Engineering Congress of the World Power Congress is to be held from June 22nd to 27th at the Central Hall, Westminster. Among the subjects to be discussed are welding problems and non-corrodible materials for plating plant; the selection and application of fuel and power, including the distribution of electricity, the preparation of coal for industrial purposes, and the de-ashing and de-watering of fine coal; recent developments in low-temperature carbonisation; and the heating of reaction vessels by electrical means.

## Short Courses for Engineering Teachers

The Board of Education is arranging for short courses for engineering teachers in technical colleges and schools to be held at New College, Oxford, from July 20th to 31st. There are two courses in engineering science, consisting of lectures and discussions to be conducted by Dr. W. Abbott, Dr. W. E. Fisher, Prof. B. P. Haigh, Prof. F. C. Lea, Mr. A. W. Loveridge, Dr. T. J. Murray and Mr. F. H. Reid. An electrical engineering course, devoted mainly to the subject of radio communication, will be conducted by Prof. G. W. O. Howe, Mr. E. B. Moullin and Dr. E. Mallett, together with other lecturers drawn from the radio industry. A series of evening lectures on various subjects will be given.

Applications from suitably qualified teachers should be sent to the Board on Form 106 U(T) not later than March 30th. Full particulars of these courses are given on Form 105 U(T.i), which may be obtained from the secretary, Board of Education, Whitehall, London, S.W.1.

## The E.P.E.A. (London Technical Group)

The seventh annual dinner-dance of the London Local Technical Group of the E.P.E.A. was held at the Café Royal, Regent Street, W., on March 2nd, under the chairmanship of Mr. W. F. Andrews, A.M.I.E.E., the principal guests being the president of the I.M.E.A. (Mr. E. E. Hoadley) and the newly appointed president of the E.P.E.A. (Mr. C. Cooper). Following the dinner, dancing proceeded until midnight. The popularity of the event can be judged from the fact that there were 280 present. Credit for the success is due to Mr. J. Parr-Morley (hon. secretary) and his committee.

## Appointments Vacant

Deputy electrical engineer (salary £350 to £425 per annum) for Sale U.D.C.

Meter tester and repairer for Barking Electricity Department.

Charge engineer for the West Midlands J.E.A.

Temporary assistant engineer for the Ministry of Transport.

Mains assistant for Darwen Electricity Department.

Combustion engineer, four boiler house shift engineers and chemist for Swansea Electricity Department.

(See our classified advertisements.)

# Makers' Names Wanted

SECTOLITE shop window lighting trough.

Hand lamp with both front and top lenses.

AUTO CHEF electric cooker.

# Our Personal Column

**Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements**

**Mr. J. B. Longmuir,** employment manager of Messrs. Mavor & Coulson, Ltd., has been appointed to the Advisory Council on Scottish Education. Speaking to over 150 parents and teachers at a Lanarkshire meeting of the Educational Institute of Scotland, Mr. Longmuir said that for the past twelve years Messrs. Mavor & Coulson have made use of tests to help them find the right boys for their apprentices. So successful were they that the boys' workmanship reports were all excellent.

Mr. C. Cooper

**Mr. C. Cooper** is the new president of the Electrical Power Engineers' Association. He is well known in electrical circles in the London area, having been on the staff of the Woolwich Corporation Electricity Department since 1908. At present he holds the position of station superintendent.

**Mr. J. B. Rudkin,** A.M.I.E.E., who, as stated in our "Trade Announcements" to-day, has relinquished his connection with Standard Switchgear, Ltd., informs us that he is starting a new company to continue the production of modern high- and low-voltage switchgear.

**Mr. G. H. Brown,** of Sale, has been recommended by the Staffs Committee of Salford Corporation for the appointment of technical assistant to the consumers' engineer.

**Mr. J. E. Robertson,** chief accounting assistant in the Hackney Electricity Department, has been appointed chief administrative assistant at a salary of £650 per annum, rising to £750.

**Mr. R. V. Powditch** is leaving Power Contracts (Batwin), Ltd., to take up an appointment as assistant to the sales manager for Delco motor sales, with Delco-Remy & Hyatt, Ltd., at their London office.

**Mr. J. R. Struthers,** deputy city electrical engineer at Belfast, has been recommended by the Sheffield Corporation Electricity Committee for the appointment of general manager of the Sheffield electricity undertaking in succession to Mr. E. Morgan, who, as we have already reported, has been appointed managing director of the Shropshire, Worcestershire & Staffordshire Electric Power Co.

**Mr. V. Sinclair,** the author of the article on "Soil Heating by Electricity," which appears on page 336 of this issue, took a three-years' course in electrical engineering at the Central Technical College, under Prof. Ayrton, and during the next nine years obtained practical experience with Siemens Bros. & Co., Ltd., Latimer Clarke, Muirhead & Co., Ltd., and Hayward Tyler & Co., Ltd. For three years he was electrical buyer in London for Howard Farrar & Co., Johannesburg, and has served in the publicity departments of the G.E.C., the Ediswan Co., Siemens Bros., and the Sterling Telephone & Electric Co. He was sales manager and secretary to Ozonair, Ltd., for five years. For the past thirteen years he has worked on his own account as a journalist.

[*Curzon Studios*

Mr. V. Sinclair

**Mr. J. Munro,** A.M.I.E.E., vice-chairman of the Association of Supervising Electrical Engineers, has resigned the position of maintenance engineer with Electrical Installations, Ltd., which he had held for the past six years, and has joined the technical staff of the Bower Engineering Works (Electrical and General), of 14, Nicholas Lane, King William Street, E.C.4. Mr. Munro took up his duties on March 1st.

**Mr. A. J. Latreille** has severed his connection with Messrs. Philips Lamps, Ltd., to take up an appointment in the sales organisation of Messrs. Harcourts, Ltd., 21a, Newman St., W.1.

**Mr. V. J. Russell,** A.M.I.E.E., chief electrical engineer to Messrs. S. Smith & Sons (Motor Accessories), Ltd., who has recently returned from Germany, announces his engagement to Miss Alma Raisbeck, of Ryton-on-Tyne, Northumberland.

**Mr. F. W. Phillips** has been appointed Director of Telecommunications by the G.P.O. The Department of Telegraphs and Telephones will in future be known as the Department of Telecommunications, and the Overseas Telegraph Branch will cease to have a separate existence. Mr. Phillips entered the Post Office service as a telegraphist forty years ago, and since 1925 has been in charge of the Overseas Telegraph Branch. He was head of the British delegation to the Lucerne Radio Conference, and was a member of the Television Committee which reported in January last. He is a member of the recently appointed Television Advisory Committee.

[*Barratt's Photo Press*

Mr. F. W. Phillips

**Mr. F. L. Ogden,** borough electrical engineer, Oldham, has been elected chairman of the North-Western Area of the Electrical Development Association, and Oldham Corporation Electricity Committee has decided to place on record its appreciation of the honour conferred upon him.

**Mr. E. A. Behrens,** who has been assistant electrical engineer to the Port Elizabeth Municipality for the past fifteen years, and has acted as city electrical engineer for the past year, has been appointed to the position of city electrical engineer as from February 1st.

**Mr. L. Howles,** who was recently appointed general manager of the South Wales Electric Power Co., was elected president of the S.W.P. Area Circle of Authorised Electrical Contractors at the annual general meeting held on February 13th. As a token of welcome to Mr. Howles the Circle members presented him with a suitably inscribed electric clock for use in his new office.

A *Reuter* message from Chicago states that **Mr. Samuel Insull** again appeared at the Criminal Courts, Chicago, on March 4th, while a jury was selected to hear the State charges against him of embezzling $66,000.

**Mr. J. B. Glen** has been appointed by the Tynemouth Corporation to succeed **Mr. C. Turnbull,** who is retiring in June next, as borough electrical engineer. Mr. Glen was educated at James Gillespie's School, Edinburgh, and received his technical training at the Heriot Watt College, Edinburgh. He served his apprenticeship with Messrs. King & Co., Leith, after which he joined the staff of the Falkirk Corporation, and was later charge engineer with Leith Corporation Electricity Department. In 1904 he was appointed to the staff of the Tynemouth electricity undertaking as assistant mains superintendent, and subsequently was promoted to the position of mains superintendent. He was appointed deputy borough electrical engineer in 1920. Mr. Glen is an associate member of the I.E.E.

Mr. J. B. Glen

**Mr. J. M. Vevers,** of the test engineering department of Messrs. E. K. Cole, Ltd., has been appointed to take charge of the test engineering department of the Atlas Works of Messrs. H. Clarke & Co. (Manchester), Ltd.

**Mr. J. G. Freeman,** manager and chief engineer to the London Electric Supply Corporation, Ltd., is retiring at the end of the current month after forty-five years' service, and at the annual meeting of the company on Tuesday last, Mr. O. R. H. Bury (chairman), in referring to his retirement, said

that no small part of the success of the company was due to the ability, knowledge and patience, which Mr. Freeman had brought to bear on the many and sometimes difficult problems which he had had to solve. He wished him a long period of enjoyment on his retirement.

**Mr. C. B. Gresham,** A.M.I.E.E., late commercial manager with Messrs. Varley, has joined the staff of the Dubilier Condenser Co. (1925), Ltd., as sales supervisor in the internal organisation of the company in co-operation with **Mr. A. E. Trehearn,** the assistant sales manager. Mr. Gresham has been associated with the radio industry for the past twelve years with Messrs. Varley and with Radio Instruments, Ltd., following electrical engineering activities with the A.E.G., Siemens and H. W. Sullivan.

## Obituary

**Mr. W. Garrett.**—The death occurred on February 28th of Mr. William Garrett, managing director of Messrs. W. T. Garrett, Ltd., electrical engineers, of Middle Street, Brighton. He was seventy-one years of age, and had been engaged in the business for over fifty years.

**Mr. F. H. Thompson.**—The death has taken place of Mr. Frederick Heckels Thompson, partner in the firm of Messrs. John Thompson, electrical contractors, of Hetton-le-Hole, Co. Durham. He was in his forty-fifth year.

**Mr. B. R. Wingfield.**—The death is announced of Mr. Bernard Robert Wingfield, Ph.D., M.I.E.E., consulting electrical and mechanical engineer, which occurred on March 2nd, at Brooklyn, West Drayton, Middlesex, in his sixty-fourth year.

**Mrs. L. G. Sloan.**—The numerous friends of Mr. L. G. Sloan, of the Sloan Electrical Co., Ltd., will join us in expressing sympathy with him on the death of Mrs. Sloan, which occurred in a London nursing home on March 1st.

**Mr. J. Warrack.**—The death occurred on February 17th, at Johannesburg, from heart failure, at the age of fifty-seven, of Mr. John Warrack, of the Victoria Falls & Transvaal Power Co.

**Mr. W. Braby.**—The death occurred on February 28th, at Hampstead, of Mr. Walter Braby, chairman since 1917 of Messrs. Frederick Braby & Co., Ltd. The interment took place on Tuesday last at Hampstead Cemetery.

**Mr. F. A. Fitzpayne,** manager of Edinburgh Corporation Transport Department, died on March 3rd, at the age of fifty-nine. He received his training at Faraday House, London. He collaborated with Mr. R. Stuart Pilcher, now at Manchester, in the changing over of the Edinburgh system from cable to electric traction, and was responsible for the introduction of all-steel bodies for tramcars. Mr. Fitzpayne had extensive experience as an electrical and transport engineer. In 1900 he entered the service of the South London Electric Supply Corporation, Ltd., as assistant engineer, and a year later went to Great Yarmouth as an assistant electrical engineer on the supply side. From 1902 to 1906 he was assistant electrical and tramways engineer. He was a member of the Institution of Electrical Engineers.

**Mr. E. Bowden.**—We regret to record the death of Mr. Edward Bowden, D.Sc., A.M.I.E.E., a director of the Enfield Cable Works, Ltd., which occurred on Sunday last in London, at the age of forty-five. Dr. Bowden was the son of Mr. J. A. Bowden, of Sunderland, and received his education at Bede School, Sunderland; Armstrong College, Newcastle-upon-Tyne; and the Technische Hochschule, Karlsruhe, Germany. He served his apprenticeship with Messrs. John Dickinson & Sons, Ltd., and from 1910-12 was a Royal (1851) Exhibition scientific research scholar. From 1915-17 he was shop manager in the Royal Ordnance Factories, and from 1917-19 was a lieutenant in the R.N.V.R. He joined Messrs. Merz & McLellan in 1919, and remained with them until the end of 1926, when he joined the Enfield Cable Works, Ltd., as technical director. He obtained the D.Sc. (Durham) degree in electrical engineering in 1909, and he was a Dipl.-Ing. of Karlsruhe. The interment took place at Grangetown Cemetery, Sunderland, yesterday (Thursday).

**The late Dr. E. Bowden**

**Will.—Mr. J. B. Braithwaite,** chairman of the City of London Electric Lighting Co. and the Electric & General Investment Co. left unsettled estate value at £30,875 (net personalty £11,320).

# Financial Section

**New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares**

## New Companies Registered

**Solus, Toranta.**—Public company. Registered February 23rd in Dublin. Nominal capital £100,000 in £1 shares. Objects: To acquire the lands and premises known as Corke Abbey, Dublin, with the mansions, buildings and outoffices and the factory buildings now in course of erection thereon, and to carry on the business of manufacturers of and dealers in electric light bulbs of all kinds, &c. The directors are: D. Frame, "Tramore," Novare Road, Bray, Co. Wicklow; James J. Walsh, Ailesbury Road, Dublin, company director; Matthew J. McCabe, Trimbleston, Blackrock, Co. Dublin, company director; Michael W. O'Reilly, Moorfield, Roebuck, Dundrum, Co. Dublin.

**P. M. De Groot, Ltd.**—Private company. Registered February 27th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless and telephonic receiving apparatus, television, and sound recording and reproducing apparatus, electricians, electrical engineers, &c. The first directors are: P. M. De Groot and Mrs. Elsie E. De Groot, both of 697, Bristol Road, South, Northfield, Birmingham. Registered office: 697, Bristol Road, South, Northfield, Birmingham.

**J. W. Jeffrey, Ltd.**—Private company. Registered in Edinburgh February 26th. Capital, £4,000 in £1 shares. Objects: To acquire the business of James W. Jeffrey, 23, Stewarton Street, Wishaw, and 200, Brandon Street, Motherwell, radio and electrical engineer. The first directors are: J. W. Jeffrey, "Stanley," Newmains, and two others. Registered office: 23, Stewarton Street, Wishaw.

**Croxtons Engineering Co., Ltd.**—Private company. Registered March 1st. Capital, £2,583 10s. in 2,500 "A" ordinary shares of £1 each and 1,670 "B" ordinary shares of 1s. each. Objects: To carry on the business of manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, batteries, conductors, insulators, transformers, &c. The subscribers are: E. J. Evershed and V. M. Evelyn, both of 231, Strand, W.C.2. Solicitors: Helliwell, Harby & Evershed, 231, Strand, W.C.2.

**Lidolite Illuminations, Ltd.**—Private company. Registered February 25th. Capital. £6,000 in £1 shares (4,000 "A" and 2,000 "B"). Objects: To acquire, exploit and manufacture all patents, rights and designs of H. L. Tredee in respect of improvements connected with the projection of coloured lights and apparatus for use therewith, to carry on the business of electrical engineers and contractors, dealers in and manufacturers of all classes of electrical appliances, wireless and television apparatus, &c. The first directors are: C. H. Keen, address not stated (chairman), and two others. Secretary: Chas. H. Keen. Solicitors: Ingledew & Sons, 4, Mount Stuart Square, Cardiff.

**Rogers & Kirkby, Ltd.**—Private company. Registered February 26th. Capital, £2,000 in £1 shares (1,000 6 per cent. cumulative preference and 1,000 ordinary). Objects: To acquire the business of electrical engineers carried on by "Rogers & Kirkby," at 65, Charminster Road, Bournemouth, &c. The permanent directors are: H. S. Rogers, "Braidley Lodge," Braidley Road, Bournemouth, and E. G. Kirkby, 38, Richmond Park Avenue, Bournemouth.

**F. & D. Robinson (Warlingham), Ltd.**—Private company. Registered February 26th Capital, £3,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical, wireless and television apparatus, gramophones, &c. The permanent directors are: A. C. Robinson, "The Brambles," Tydecombe Lane, Warlingham, Surrey, and two others.

**Relay Systems (Port Glasgow), Ltd.**—Private company. Registered in Edinburgh February 27th. Capital, £5,000 in £1 shares. Objects: To acquire the radio relay system of W. E. Reid, of 10, Bridge Street, Hawick. The first directors are: J. Marshall, 11, Slitrig Crescent, Hawick, and W. E. Reid, 10, Bridge Street, Hawick. Registered office: Town Buildings, Port Glasgow.

**W.H. Electric Control Gear, Ltd.**—Private company. Registered February 28th in Edinburgh. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical engineers, manufacturers of electric control switchgear and apparatus, &c. The first director is J. W. Grant, 78, Mossgiel Road, Newlands, Glasgow. Registered office: 23, Douglas Street, Glasgow, C.2.

## Returns of Electrical Companies

**John Richards & Co. (Electrical Engineers), Ltd.**—Capital, £6,000 in £1 shares. Return dated November 9th, 1934. 4,802 shares taken up. £2 paid, £4,800 considered as paid. Mortgages and charges nil.

**N.R.S., Ltd.**—The nominal capital has been increased by the addition of £1,500 beyond the registered capital of £10,000. The additional capital is divided into 1,500 preference shares of £1 each.

**Siemens Bros. & Co., Ltd.**—Satisfaction to the extent of £43,400, on January 1st, 1935, of debenture stock authorised January 15th, 1918, secured by trust deed of same date, and registered January 21st, 1918.

**Highfield Electrical Co., Ltd.**—H. H. Sherwood, York House, Great Charles Street, Birmingham, was appointed receiver and

manager on February 19th, 1935, under powers contained in first mortgage debenture dated December 22nd, 1926.

**F. C. Hill & Co., Ltd.**—Debenture dated February 9th, 1935, to secure £1,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: W. J. Woolley, Princes Square, Wolverhampton.

**Ferguson Radio Corporation, Ltd.**—Particulars filed of £3,000 debentures authorised February 14th, 1935, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

**New Era Time & Telephone Systems, Ltd.**—Issue on December 15th, 1934, of £150 debentures, part of a series already registered. (Particulars of issue filed February 18th, 1935.)

**Salcombe Gas & Electricity Co., Ltd.**—Debenture, charged on deeds and documents relating to freehold properties in Salcombe, Kingsbridge and Kingsbridge Estuary, Devon, and the company's undertaking and other property, present and future, including uncalled capital, dated February 14th, 1935, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

**Solidite & Synthetic Mouldings, Ltd.**—S. E. Smith, 4, Broad Street Place, E.C., was appointed receiver and manager on February 23rd, 1935, under powers contained in Land Registry Charge dated July 31st, 1929.

**Ever Ready Electric Carbon Co., Ltd.**—Capital, £50,000 in £1 shares. Return dated December 6th, 1934. 30,000 shares taken up. £30,000 paid. Mortgages and charges nil.

**Synchrolarm, Ltd.**—Particulars filed of debentures not exceeding £600 authorised January 31st, 1935, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £600.

**Drake & Gorham, Ltd.**—Capital, £125,000 in £1 shares. Return dated November 20th, 1934. All shares taken up. £85,000 paid, £40,000 considered as paid. Mortgages and charges: £66,608.

**Simplex Conduits, Ltd.**—Capital, £100,000 in £1 shares. Return dated November 6th, 1934. 90,000 shares taken up. £50,000 paid, £40,000 considered as paid. Mortgages and charges nil.

**L.R. Supply Co., Ltd.**—Satisfaction to the extent of £400 on February 14th, 1935, of debentures authorised February 12th, 1934, and registered February 15th, 1934.

**Mevagissey Electric Supply Co., Ltd.**—Satisfaction in full on January 30th, 1935, of debentures dated June 24th, 1907, and registered June 29th, 1907, securing £1,300.

# City Notes

**The Westminster Electric Supply Corporation, Ltd.,** held its annual meeting on March 5th, when Lord Wargrave (chairman) in referring to the linking-up of the company's resources with those of five other London companies, said the disadvantages of a number of self-contained companies supplying electricity in London without the machinery for complete co-operation were manifest, but he did not think the best remedy was to break up immediately the existing organisations by attempting a complete centralisation. The proper course to follow, and the one which the directors were proposing the shareholders should adopt, was a common identity of ownership under a centralised control, but leaving the areas to be grouped and managed in convenient-sized units. The advantages to be gained included economy in capital expenditure, greater financial strength, improved services to the public and a gradual levelling of selling prices over a large area. It should be possible for considerably increased facilities in connection with the wiring of their premises and the purchase of apparatus to be offered to consumers with additional benefits accruing to the shareholders as a result. This field would be fully developed but it should not be assumed that it would involve the raising of fresh capital or any alteration in the nature of the security of the ordinary capital. It was merely the development of the policy adopted by other large groups operating in adjacent areas. Turning to the accounts, he said that the cost of current purchased showed an increase of £48,000. The London Power Co. had made provision for a greater consumption than was reached, with the result that the Central Electricity Board was enabled to take a large supply from Battersea without any payment in respect of capital costs. The effect was to throw the burden of this deficiency in the revenue of the London Power Co. upon the constituent supply companies, of which their company was one of the largest. They were hopeful that with the formation of the London Associated Electricity Undertakings, Ltd., there would be greater co-operation between the generating and distributing companies. During 1934 over 80 per cent. of the electricity sold was a.c. and the efficiency of their distributing system was now one of the highest in the country.

**The St. James' & Pall Mall Electric Light Co., Ltd.,** held its annual meeting on March 5th, when the Earl of Balfour (chairman), who presided, said the decrease in the net profit was due to the increased cost per kWh purchased from the London Power Co., and the decreased amount per kWh received from consumers. The increased charge by the Power Co. was due to the Central Electricity Board's disputing its liability to contribute to certain items of cost, leaving the whole burden to fall on the Power Co.'s constituent members. The Power Co. was endeavouring to rectify this anomaly. They proposed to revert to the standard dividend of 7 per cent., and to employ practically the whole of the sum in No. 2 reserve fund in payment of a special bonus of 3d. per share to the ordinary shareholders. The chairman then referred to the scheme for the exchange of existing shares for ordinary stock in the new company, particulars of which appear on p. 337 of this issue. The report and accounts were adopted and the conversion of the ordinary shares into stock was approved.

**The North Metropolitan Electric Power Supply Co.** reports a net revenue for the year ended December 31st last of £768,589, as compared with £685,015 in the preceding year, to which is added £35,665 brought in, making £804,254. After deducting debenture interest, &c., it is proposed to pay a final ordinary dividend of 6 per cent., making 10 per cent. for the year (same), leaving £44,501 to be carried forward. The capital expenditure during the year, mainly upon machinery, trunk and distributing mains and sub-stations, amounted to £780,748. The total capital expenditure at December 31st, amounted to £7,469,831 after deducting the cost of Brimsdown "A" generating station which has been sold to the North Metropolitan Power Station Co., Ltd., and the plant written off during the year. Approximately 218 miles of underground mains were laid and twenty-four miles of overhead lines were erected during the year. The total length of underground mains and overhead lines at the end of the year was 2,521 miles. Seventy-seven new sub-stations were put into service, making the total number 665. The sales of electricity totalled 423,500,000 kWh, as compared with 352,500,000 kWh in 1933, an increase of 20 per cent. The total number of consumers supplied either directly or indirectly by the company was 254,735, as compared with 218,700 at the end of 1933, an increase of 16.5 per cent. The system was extended during the year to provide supply to twenty additional villages. During the year 1,635 additional street lamps were put into lighting, bringing the total to 9,875. New electricity showrooms were opened at Enfield, Wood Green and St. Albans, to replace outgrown or temporary accommodation; the Tottenham showroom has been enlarged. All standard rates for electricity were reduced as from December 1st, 1934. These concessions, which are on a more generous scale than any hitherto granted to the consumers, will represent a very substantial sum in a full year. The conversion of preference shares and ordinary shares into preference stock and ordinary stock referred to in the last report, took effect as from March 12th, 1934. Meeting: March 12th.

**The Northampton Electric Light & Power Co., Ltd.,** held its annual meeting on February 27th, when Mr. F. H. Thornton (chairman), who presided, said the generating station at Hardingstone had been "selected" by the Central Electricity Board for the Central England area and as from April 1st last they had been generating electricity to meet the Board's requirements. Sales of electricity to individual consumers and their associated companies were 58¾ million kWh, an increase of 11 per cent., over 1933. The warm weather of December caused a perceptible reduction in sales for heating during that month, but in spite of this and the diminution in the traction supply, there had been a substantial increase in the sales of electricity for all purposes. Reductions in the price of electricity which became operative last year had affected the year's revenue to the extent of £13,500, and during the past five years reductions equivalent to £43,000 in a year's receipts had been made. They supplied directly or through their associated companies an area of approximately 1,000 sq. miles of a mainly agricultural character, but despite a cheap tariff, assisted wiring, and hire and hire-purchase, only 5½ per cent. of nearly 600 farmers connected to their system used electricity for genuinely agricultural purposes. They had before them a programme of considerable extensions at the Hardingstone generating station, and were installing an additional 30,000-kW turbo-alternator with buildings and plant, which would cost not less than £375,000. Tenders for the work had been accepted and the extensions already commenced. These extensions were being made to meet the requirements of the Central Board which would be responsible for payment of the interest on the capital expended. The company would also have to provide for the usual developments in its own area. An issue of capital would be needed in the course of the next few months, but it was not possible at the moment to announce what form the issue would take.

**The Electrical Distribution of Yorkshire, Ltd.,** held its annual meeting on March 5th. Mr. R. W. Wickham, who presided, said that the accounts showed a further expansion of revenue accompanied by a record increase in the amount of electricity sold and in the number of new customers. They had more than doubled the number of customers in the last five years. Their subsidiaries were making good progress. The Penrith Co. had recently obtained a Special Order which deferred the first optional date of purchase by the local authority from 1950 to 1981. Since they acquired the undertaking they had reduced the average price per kWh by 36 per cent. The year had been one of active development of their Mid-Cumberland undertaking, a supply having been made available in thirty-three further towns and villages. The issue of £300,000 of 6 per cent. cumulative preference shares made a year ago was fully applied for. Following the ordinary business of the meeting a resolution was passed converting the shares into stock.

**The Midland Counties Electric Supply Co., Ltd.**—Presiding at the annual meeting held on February 4th, Mr. G. Balfour (chairman) said that the year was the first complete year of operating the transport services entirely by electric trolley or petrol buses. These vehicles were running over 575 route miles, and the balance on the operation of these properties amounted to £32,025, which had been left in reserve in these undertakings as provision against the value of statutory rights, &c. Regarding the electricity supply business, they connected an additional 12,675 consumers, bringing the total to 75,560, and the total sale of electricity was 262,500,000 kWh, an increase of about 11 per cent. The total plant capacity of their three power stations was 120,000 kW and they had received directions for the installation of an additional 30,000-kW turbo-generator and the necessary boiler plant at Spondon station. During the year they laid sixty-eight miles of e.h.p. transmission lines, bringing the total route mileage to 1,377 miles, and in addition 157 miles of l.p. lines were laid, making a total of 1,399 miles. The h.p. mains of the operating companies fed a total of 1,103 transformer stations. They extended their services to thirty-one parishes and now afforded supplies to three boroughs, thirty-one urban districts and 493 parishes in rural districts. In addition, street lighting systems were provided during the year in eight parishes and extensions were made to existing systems. They now provided public lighting in two boroughs, seventeen urban districts, and 102 parishes. In the Derbyshire and Nottinghamshire Electric Power area the average received

from all consumers amounted to 0.64d. per kWh, and excluding all large bulk supplies and special contracts the average for the whole of the miscellaneous power and domestic business in this area was 1.117d. per kWh, and in the Leicestershire and Warwickshire Electric Power Co.'s area, 1.123d. per kWh. In the four counties in which they supplied, covering 2,200 sq. miles, they were excluded from the larger boroughs and cities, so that the density of population was small. Regarding the current year business was progressing normally and they could look forward confidently to the year's results.

**The London Electric Supply Corporation, Ltd.,** held its annual meeting on March 5th, when Mr. O. R. H. Bury (chairman), who presided, said the sales of electricity at 325,211,132 kWh were a record, and they would have been higher had it not been for the loss of certain large consumers, principally due to the transfer of mills from their area. They had connected a larger number of new consumers during the past year than in any previous year. They had obtained a contract from the Deptford Borough Council for the installation of electric discharge lamps for street lighting, and this form of lighting had proved so successful that extension of the system to other roads has been requested by the Council. The introduction of the business and domestic tariffs had led to a considerable increase in the consumption of electricity by this class of consumer, and with the object of still further encouraging the use of electricity, the "unit" charge under these tariffs was reduced to ½d. per kWh in September last. The response to that reduction had been a more extensive adoption of the all-in tariffs. The greater part of the twenty-seven miles of mains laid during the year was in their residential area, and they were confident that the application of the domestic tariffs would justify the expenditure. Under the sliding scale they had reduced the rate by ½d. per kWh, as from the beginning of the current year. Referring to the merging of the six London supply companies, the chairman said that although they had not yet joined these companies, they hoped it might be possible to do so later on, when they had got closer together. They had, however, made arrangements in the Westminster and the St. James' companies, whereby overlapping and possibly wasteful competition was eliminated. The 25-cycle system for power supplies to large consumers had been entirely changed during the year to the standard frequency, and the whole of their a.c. supply, with the exception of the supply to the Southern Railway, was now being given at 50 cycles. An additional feeder cable had been laid from Deptford West generating station to the Southern Railway's switch-house at Lewisham Junction, to supplement the thirteen cables already laid.

**The English Electric Co., Ltd.,** reports a trading profit for 1934, after crediting dividends receivable from Willans & Robinson, Ltd., of £172,215, as compared with a trading loss of £175,681 for 1933. After providing for debenture interest, rent and interest payable to Willans & Robinson, &c., and placing £50,000 to depreciation, there is a net profit for the year of £31,902, which is placed to profit and loss account, leaving a debit balance on that account of £245,368 to be carried forward. The dividend on the 6½ per cent. cumulative preference shares is in arrear from January 1st, 1934. The report states that the liquid assets of the company amount to £1,278,640. For the first time for several years the volume of business placed in 1934 in the heavy electrical industry showed a substantial recovery. The company was successful in obtaining a full share of that business. The improvement was spread over the whole range of its manufactures, and the large number of inquiries which are being received by the industry for plant of all types, both from this country and from abroad, suggests that the revival of demand is not of a casual or momentary nature. While turnover has increased, prices have hardened. Good progress has been made during the year in the development of domestic and other lighter apparatus, and the directors have spared no effort to improve still further the technical and manufacturing efficiency of the company. The report records the death of Mr. J. H. Gannon, who resigned from the board during the year, and the appointment of Mr. H. T. Rice as a director.

**The Telegraph Construction & Maintenance Co.** reports a net loss for 1934 of £8,903, as against £24,595 for the preceding year. The balance at credit of profit and loss brought in is £38,856, from which is deducted the year's loss, leaving £29,953 to be carried forward. The report states that orders for submarine cable, although slightly better than in the previous year, have not been sufficient to keep this branch of the company's works fully occupied. Further reductions have been made in the standing charges. The new factory for the production of power distribution cables was completed in June and satisfactory orders have been received. Sir Arthur Balfour has been elected to a seat on the board. Meeting: March 26th.

**The Hendon Electric Supply Co., Ltd.,** reports a net profit for 1934 of £47,916, as compared with £40,828 in the preceding year. The repairs and renewals fund receives £20,654, and general reserve receives £3,209. It is proposed to pay a final dividend of 5½ per cent., tax free, making 7¾ per cent. for the year (against 7½ per cent.), and to carry forward £17,089. During the year certain of the investments have been sold at a considerable profit and that profit has been added to the reserve against investments. The sales of electricity during the year totalled 33,851,990 kWh, as against 31,288,551 kWh in 1933. Meeting: March 11th.

**McMichael Radio, Ltd.,** reports a loss for 1934 of £46,306, and after deducting a credit balance of £2,455 brought in, a debit of £43,851 is carried forward. The directors in their report state that the loss has been occasioned by reductions in prices which took place during the year as the result of intensive competition. They state, however, that steps have now been taken in the industry generally to avoid a repetition of the unhealthy competition, with the result that the company will be placed in a position to show more satisfactory results in the current year.

**The South Wales Electric Power Co.** reports a net revenue for 1934 of £182,604, as against £163,075 in 1933. After deducting debenture interest, &c.. and placing £60,000 to depreciation and reserve, it is proposed to pay an initial dividend of 2 per cent. for the year on the £677,850 ordinary shares, the £322,150 of additional capital issued in November last ranking for a month's dividend at that rate. The Upper Boat power station is being operated with effect from January 1st last under the direction of the Central Electricity Board. The carry-forward is £5,448.

**The National Gas & Oil Engine Co., Ltd.,** reports a net profit for the year ended December 31st last of £13,957, as compared with a loss of £9,679 in the preceding year, to which is added £460 brought in, making £14,417. It is proposed to pay a dividend on the preference shares for the year ended December 31st, 1933, at the rate of 5 per cent., less tax, and to carry forward £5,117. The directors state that the trading result does not permit of dividends being paid on the preference and ordinary shares for 1934. Meeting: March 11th.

**The Metropolitan Electric Supply Co., Ltd.,** reports a gross revenue for 1934 of £1,153,533, as compared with £1,106,815 for the preceding year. The net revenue is £327,509 (against £351,593), which with £154,993 brought in, interest, dividends, &c., makes £610,695 available. The ordinary dividend for the year is maintained at 10 per cent., £76,381 is transferred to depreciation and reserve, and £5,242 to contingency fund, and £135,792 is carried forward. Meeting: March 12th.

**The Telephone & General Trust, Ltd.,** reports a net profit for 1934 of £106,765 (against £100,393 for 1933). A final ordinary dividend of 5 per cent. is proposed, making 8 per cent. for the year, and 8 per cent. is to be paid on the "A" ordinary shares, leaving £47,572 to be carried forward.

**The Bournemouth & Poole Electricity Supply Co., Ltd.,** has declared a final ordinary dividend of 9 per cent., making 15 per cent. for the year (unchanged).

**The Richmond (Surrey) Electric Light & Power Co., Ltd.,** has announced a final dividend of 7 per cent. on the ordinary shares, making 11 per cent. for the year (same).

**The City of London Electric Lighting Co., Ltd.,** has recommended the standard dividend of 7 per cent. on the ordinary shares for 1934, with an additional distribution of ½ per cent. out of reserve No. 2, making 7½ per cent. for the year. Of this, 3½ per cent. was paid in September last.

**Brown Bros., Ltd.,** have declared a final ordinary dividend of 7½ per cent., making 10 per cent., less tax, for the year. The directors have decided to increase the capital by the issue of one new ordinary share for each five ordinary £1 shares held, at a premium of 10s. per share.

**Vickers, Ltd.,** have declared final dividends of 2½ per cent. on the preferred 5 per cent. stock (less tax), the 5 per cent. preference shares (less tax), and on the cumulative preference shares (free of tax).

**The Llanelly & District Electric Supply Co., Ltd.,** reports a profit for 1934 of £60,883, against £59,515 in 1933. The ordinary dividend for the year is 5 per cent. less tax (against 4½ per cent.), and £1,117 is carried forward.

**Davis & Timmins, Ltd.,** are paying a final dividend on the ordinary shares of 3½ per cent., making 6 per cent. for the year (against 5 per cent.).

**The British Columbia Power Co.** has announced a quarterly dividend of 38 cents per share on the class "A" shares.

**The Isle of Thanet Electric Supply Co., Ltd.,** has declared an ordinary dividend for 1934 of 4 per cent. (same).

**Ward & Goldstone, Ltd.,** are paying the usual final dividend for the year on the cumulative preference shares at the rate of 7 per cent. per annum.

**The Folkestone Electricity Supply Co., Ltd.,** has declared a final dividend on the ordinary shares of 6 per cent., maintaining the distribution for the year at 10 per cent., tax free.

## Stocks and Shares

TUESDAY EVENING.

FULLER details are now available in regard to the new company, London Associated Electricity Undertakings, that has been formed with a capital of £300 with the intention of unifying six of the big London companies and bringing them more or less under one control. These companies and their capitals are as follows:—Brompton, £419,069; Chelsea, £457,864; Kensington, £490,525; St. James', £870,500; Westminster, £2,000,000; and Charing Cross, £2,654,236. Holders of shares in these companies are asked whether they will agree to exchange into the newcomer; and, if the proprietors of 90 per cent. of the shares so decide, the capital of the new company will be a little over seven million pounds. Of this, £1,405,000 is to be in 4½ per cent. cumulative preference shares, £1,953,963 in 6 per cent. cumulative preference shares, and £4,663,083 in ordinary shares. The shares are to be converted into stock.

### Political Repercussions

The Government sprang an unpleasant surprise upon the country in making heavy additional demands for money in connection with the Army, Navy and Air Force. With the advisability of increasing the national defences, many people are in cordial agreement. But the Government's presentation of the case came as a mild shock. It wrought weakness in the markets for gilt-edged securities. Violent fluctuations in foreign exchange, and a big rise in the price of gold, have added to the excitements of the day-to-day developments. Shares in companies likely to be affected by the rearmament proposals are in request.

### Transport "C"

London Passenger Transport "C" stock, owing no allegiance to the other and more severely gilt-edged issues of the Board,

is up 4 points to 97, on expectations of an increased dividend. The traffics, alone amongst those of the railway systems, are making substantial headway. A dividend has been declared this week of 1 per cent. actual on Metropolitan assented stock. This is on account of interest for the year ending June 30th, 1935. It may be recalled that the security of this stock is London Passenger Transport "C," and that interest on the Metropolitan assented is guaranteed for fifteen years from July, 1933, at 3¼ per cent., with 3 per cent. for another ten years. The price of the Metropolitan assented stock is quoted at 87.

London Transport "A" and "B" stocks have both given way a point or two. The purely gilt-edged issues are dull as a whole, the "boom" in gold, the metal, causing a certain degree of anxiety in the minds of holders of all stocks and shares in which any substantial foreign stake is involved. It is thought that the present price of gold may cause sales on the London markets of Stock Exchange securities held by foreigners and by residents abroad. As against this may be set the fact that accumulations of capital are as obvious as ever. It remains a matter of great difficulty for Stock Exchange and other financial advisers to indicate profitable directions for the employment of investment money.

## Main Line Electrification

The Southern Railway is so satisfied with the result of electrification that further extensions are being made. The London & North Eastern board declares that electrification of that company's suburban lines is bound to be a losing proposition. The ultimate decision on this latter point rests with the Standing Joint Committee that represents the four main line railways and the London Passenger Transport Board.

## Electricity Supply Shares

Few alterations of importance have occurred in the lists of prices in this group. Publication of the details mentioned in the first paragraph rekindled interest, without bringing noticeable accession of business. The City of London Electric has declared 4 per cent. final dividend for last year, making 7 per cent., with an additional ½ per cent. bringing the dividend to 7½ per cent., the same as that of a year ago. The price of the shares remains unchanged at 37s. After the falls that have occurred in this market during each of the past three weeks, there has been a disposition for prices to steady. The South Wales Power Company's ordinary shares enter the dividend list with a maiden distribution of 2 per cent. The ordinary shares are not quoted, but the price of the 5 per cent. redeemable debenture stock is about 103, the company's 5 per cent. prior lien debenture stock standing a point higher. Llanelly ordinary are steady at 25s. 6d. upon repetition of the 5 per cent. dividend.

Amongst foreign issues, a fair amount of activity in Palestine ordinary shares, recently offered at 25s., has left the price 6d. harder on the week at 37s.: that is, 12s. premium. The preference are quoted at 1s. 7½d. premium. Tokyo Electric sixes have further advanced to 87. West Gloucestershire ordinary, after a drop of 3 points to 90, rallied to 92. On the other hand, Hendon shares have risen to 54s., the report showing very good figures.

## Cable and Wireless

After being a dull and somewhat disturbed market, Cable & Wireless stocks took a turn for the better. Prices of the preference and of the "A" ordinary are up 1½ and ¼ respectively. As regards the preference, here also, as in the London Transport "C" stock, expectation looks for an increase in the dividend, and an announcement is expected within the next month or two. Globe Telegraph ordinary strengthened to 11¾, a gain of ¼. Marconi Marines have gone back to 35s. after their recent improvement. What may be called the television group shows weakness. Electric & Musical Industries, which touched 33s. 3d., are back to 30s. 6d., there being nebulous rumours of a possible disappointment when the accounts are published. Telegraph Constructions gave way sharply on the issue of a report which again shows a loss, though less than that of a year ago. At the meeting, resolutions are to be proposed whereby the scope of the company's activities can be increased. The present articles are 70 years old, and although business conditions have altered, the articles remain as they were in 1864. There is some talk of a possible increase in the dividend on International Automatic Telephones. The price of the shares keeps very steady at 39s., the "B" deferred being 37. Telephone Rentals are a little lower at 8s.

## Manufacturing and Equipment

Henley's have slipped back to 6⅞, British Insulated to 76s. 3d. Associated Electrical ordinary shares at 25s. have put on 1s. General Electrics are also the turn better, and the new shares at 48s. 6d. show a gain of 9d. Reyrolle's keep at a few pence over £3.

Amongst miscellaneous matters may be noted a fall to 49 in Perak Hydro-Electric 7 per cent. debentures. Tata Power 2 per cent. scrip, offered at 98 and standing a week ago at ¾ premium, rose to 2¼ premium before reacting to 1¾ premium. Electrical Finance & Securities shares at 65s. 6d. have lost a few pence. The rubber share market is depressed by the heaviness of the raw material's price. Vickers shares improved, on the rearmament proposals. Babcocks are a trifle down.

# Share List of Electrical Companies

### Home Electricity Companies.

| | Nom. | Dividend. 1932. | Dividend. 1933. | Price. Mar. 5. | Rise or Fall. | Yield. £ s. d. |
|---|---|---|---|---|---|---|
| Bournemouth and Poole | 1 | 15 | 15 | 77/6 | — | 3 16 2 |
| Brompton Ordinary | 1 | 7 | 7 | 36/– | — | 3 17 9 |
| Charing Cross Ordinary | 1 | 7 | 7 | 34/6 | — | 4 1 2 |
| Chelsea | 1 | 7 | 7 | 36/– | — | 3 17 9 |
| City of London | 1 | 7½ | 7½ | 37/– | — | 4 1 1 |
| Clyde Valley | 1 | 7 | 7 | 42/6 | +6d. | 3 15 2 |
| County of London | 1 | 10½ | 10½ | 57/– | +6d. | 3 13 8 |
| Edmundson's 7% Pref. | 1 | 7 | 7 | 36/6 | — | 3 16 8 |
| Elec. Dis. Yorkshire | 1 | 9 | 9 | 47/– | −6d. | 3 16 8 |
| Elec. Supply Corporation | 1 | 11 | 11 | 57/6 | — | 3 16 5 |
| Kensington Ordinary | 1 | 7 | 7 | 35/6 | −6d. | 3 19 0 |
| Lancs Light and Power | 1 | 7 | 7½ | 37/– | — | 4 1 1 |
| London Electric | 1 | 7 | 7 | 38/6 | −6d. | 3 12 10 |
| Metropolitan | 1 | 10 | 10 | 52/– | — | 3 17 1 |
| Midland Counties | 1 | 7 | 7 | 37/– | — | 3 15 8 |
| Mid. Elec. Power | 1 | 8 | 8 | 50/– | — | 3 4 0 |
| North Eastern Electric Ordinary | 1 | 6 | 6 | 32/6 | — | 3 13 10 |
| Do. 7% Pref. | 1 | 7 | 7 | 35/6 | — | 3 19 0 |
| Northampton | 1 | 10 | 10 | 53/0 | — | 3 14 4 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 14½ | — | 4 4 4 |
| North Met. Elec. Ordinary | 1 | 10 | 10 | 60/9 | — | 3 5 7 |
| Do. do. 6% Pref. | 1 | 6 | 6 | 32/– | — | 3 15 0 |
| St. James and Pall Mall | 1 | 7 | 7½ | 35/–xd | — | 4 5 9 |
| Scottish Power | 1 | 8 | 8 | 41/3 | — | 3 17 8 |
| South London | 1 | 7 | 7 | 36/– | — | 3 17 9 |
| Westminster Ordinary | 1 | 7 | 7 | 34/– | −1/6 | 4 2 4 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 27/– | — | 5 11 1 |
| Yorkshire Elec. | 1 | 8 | 8 | 44/6 | — | 3 12 0 |

### Public Boards.

| | | | | | | |
|---|---|---|---|---|---|---|
| Central Electricity, 1950–70 | Stock | 5 | 5 | 116 | — | 4 6 2 |
| Do. 1955–75 | „ | 5 | 5 | 118xd | — | 4 4 9 |
| Do. 1951–73 | „ | 4½ | 4½ | 112 | — | 4 0 4 |
| Do. 1963–93 | „ | — | 3½ | 101½ | −½ | 3 9 0 |
| London & Home Counties, 1955–75 | „ | 4½ | 4½ | 114 | — | 3 19 0 |
| London Passenger Transport, A | „ | — | 4½ | 121½ | −2 | 3 14 0 |
| Do. do. B | „ | — | 5 | 124½ | −1 | 4 0 4 |
| Do. do. C | „ | — | 3 | 97 | +4 | 3 1 10 |
| West Midlands Joint Elec. 1948–68 | „ | — | 5 | 118xd | +1½ | 4 4 9 |

### Telegraph and Telephone.

| | | | | | | |
|---|---|---|---|---|---|---|
| American Tel. & Tel. | $100 | 9 | 9 | 110 | +3 | 8 3 8 |
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 121½ | — | 4 18 7 |
| Do. Def. | „ | 1½ | 1½ | 28 | −1 | 5 7 2 |
| Cable & Wireless 5½% Pref. | „ | 2¾ | 2¾ | 84½ | +1½ | 3 5 1 |
| Do. A. 7½% Ord. | „ | Nil | Nil | 18¾ | +¾ | — |
| Do. B. Ord. | „ | Nil | Nil | 6½ | — | — |
| Globe Tel. & Tel. Ord. | 10 | Nil | 2½ | 11¾ | +¼ | 2 2 7 |
| Do. do. Pref. | 10 | 6 | 6 | 13⅜ | — | 4 8 0 |
| Great Northern Tel. | 10 | 20 | 20 | 39½ | — | 5 1 3 |
| Marconi-Marine | 1 | 10 | 7½ | 35/– | −1/3 | 4 5 9 |
| Oriental Telephone Ord. | 1 | 12 | 12 | 3⅛ | — | *3 12 5 |

### Home and Foreign Trams, Etc.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. | 5 | Nil | Nil | 2/– | +6d. | — |
| Do. do. 2nd Pref. | 5 | Nil | Nil | 1/6 | — | — |
| Do. do. 5% Deb. | Stock | Nil | Nil | 5 | −2 | — |
| British Electric Traction Df. Ord. | „ | 5 | 5 | 915 | — | — |
| Do. do. Pref. Ord. | „ | 8 | 8 | 172½ | — | 4 12 9 |
| Brazil Traction | 100 | — | — | 9 | — | — |
| Brit. Columbia Elec. Rly. Pce. | Stock | 5 | 5 | 100½ | — | 4 19 6 |
| Mexican Light Common | 100 | Nil | Nil | 2½ | — | — |
| Do. 7% Pref. | 100 | 7 | 7 | 4½ | — | — |
| Do. 1st Bonds | $500 | 5 | 5 | 40 | −4½ | — |
| Victoria Falls Ord. | 1 | 15 | 20 | 7¼ | +⅛ | 2 15 6 |
| Yorkshire (West Riding) | 1 | 2½ | 5 | 28/9 | +6d. | 3 9 9 |

### Manufacturing Companies.

| | | | | | | |
|---|---|---|---|---|---|---|
| Aron Electricity Ord. | 1 | 10 | 10 | 66/3 | — | 3 3 3 |
| Assoc. Elec. Ord. | 1 | 4 | 3 | 25/– | +1/– | 2 8 0 |
| Do. Prf. | 1 | 8 | 8 | 37/6 | — | 4 5 4 |
| Babcock & Wilcox | 1 | 9 | 6 | 44/6 | −6d. | 2 14 0 |
| British Aluminium Ord. | 1 | 5 | 5 | 32/– | — | 3 2 7 |
| British Insulated Ord. | 1 | 5 | 15 | 76/3 | −⅛ | 3 18 9 |
| Brush Ord. | Stock | Nil | Nil | 40½ | — | — |
| Callender's | 1 | 15 | 15 | 3½ | — | 4 5 9 |
| Do. 6½% Pref. | 1 | 6½ | 6½ | 32/6 | — | 4 0 0 |
| Crompton Parkinson Ord. | 5/– | 22 | 12½ | 35/6 | — | 1 15 0 |
| Do. 8% Pref. | 1 | 8 | 8 | 35/– | — | 4 11 5 |
| Edison-Swan 1st Pref. | 1 | 7½ | 7½ | 23/9 | — | 6 6 4 |
| Electric Construction | 1 | Nil | Nil | 15/– | — | — |
| Enfield Cable Ord. | 1 | 25 | 20 | 4¾ | — | 5 2 6 |
| English Electric | 1 | Nil | Nil | 6/3 | — | — |
| Do. do. Pref. | 1 | Nil | Nil | 12/– | — | — |
| Ever Ready | 5/– | 35 | 35 | 22/6 | −6d. | 7 15 7 |
| Ferranti Pref. | 1 | 7 | 7 | 29/6 | — | 4 15 0 |
| G.E.C. Pref. | 1 | 6½ | 6½ | 33/9 | — | 3 17 4 |
| Do. Ord. | 1 | 8 | 8 | 48/9 | +6d. | 3 5 7 |
| Henley's | 1 | 30 | 30 | 6⅞ | −½ | 4 8 0 |
| Do. 4½% Pref. | 5 | 4½ | 4½ | 5⅞ | — | 3 16 8 |
| India-Rubber Preferred | 1 | — | — | 1½ | — | — |
| Johnson & Phillips | 1 | 5 | 5 | 28/3 | — | 3 10 8 |
| Siemens Ord. | 1 | 6½ | 4 | 1 | — | 4 0 0 |
| Telegraph Construction | £1 | Nil | Nil | 1 | —½ | — |

* Dividends paid free of Income Tax.

# Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

**1933**

10304. "Electric primary cells." C. J. Gordon. March 15th, 1934. (423738.)

12576. "Television relaxation oscillation generator systems." Radio-Akt.-Ges. D. S. Loewe and K. Schlesinger. May 2nd, 1932. (423583.)

15866. "Electric thermal switches." British Thomson-Houston Co., Ltd. June 6th, 1932. (423660.)

15880. "Television and like systems." J. L. Baird and Baird Television, Ltd. June 1st, 1923. (Cognate application 16317/34.) (423854.)

18956. "Electrically operated record-controlled statistical apparatus." Siemens Bros. & Co., Ltd., J. H. Broome and A. A. Southam. July 4th, 1933. (423737.)

19183. "Mercury-vapour generating plant." K. Baumann, A. Stubbs and Associated Electrical Industries, Ltd. July 6th, 1933. (423662.)

19276. "Electromagnetic regulator for dynamos." J. Bohli July 11th, 1932. (423739.)

19385. "Braun tube, more particularly for television purposes." M. Von Ardenne. July 11th, 1932. (423793.)

21602. "Systems for relaying and distributing radio programmes." P. P. Eckersley and R. E. H. Carpenter. August 1st, 1933. (423673.)

21636. "Scanning discs for television, telekinematographic and like systems." W. W. Jacomb and Baird Television, Ltd. August 1st, 1933. (423863.)

21786. "Thermionic discharge devices." Dr. S. Loewe and Dr. P. Kapteyn. August 3rd, 1932. (423796.)

21952. "Electric-arc lamps." L. T. Morton. August 4th, 1933. (423676.)

21985. "Automatic train-control systems." A. E. Hudd. August 4th, 1933. (423598.)

22055. "Indirectly heated thermionic cathode." Radioakt-Ges. D. S. Loewe and E. Waldschmidt. August 6th, 1932. (423800.)

22056. "Electric relay, more particularly for signalling and television purposes." Radioakt-Ges. D. S. Loewe and K. Schlesinger. August 6th, 1932. (423599.)

22469. "Light valve and method of operation." E. H. Land. August 11th, 1932. (Cognate application 22470/33.) (423874.)

22472. "Electrical secret signalling systems." C. Lorenz Akt.-Ges. September 1st, 1932. (423875.)

22787. "Control of electric oscillators for use with cathode ray tubes." J. C. Wilson, T. E. Bray and Baird Television, Ltd. August 15th, 1933. (423748.)

22853/4/6. "Lift-controlling systems." General Electric Co., Ltd., and N. C. Smart. August 16th, 1933. (423804/5/6.)

28653. "Electric motor controlling systems." General Electric Co., Ltd., and A. A. Chubb. October 17th, 1933. (423816.)

29576. "Electric transformers and choking coils." Siemens-Schuckertwerke Akt.-Ges. October 25th, 1932. (423618.)

30624. "Television and like systems." M. Bowman-Manifold and W. S. Percival. November 3rd, 1933. (423685.)

30734. "Electric fuse-boards." J. B. Tucker. November 6th, 1933. (423620.)

32323. "Protective arrangements for electric commutator motors." General Electric Co., Ltd., and F. M. Jackson. November 20th, 1933. (423817.)

33587. "Electric motors." Worthington-Simpson, Ltd., and Soc. de Participation Financière Electric Pump. November 30th, 1932. (423689.)

33847. "Protective systems for electric coal-cutter and like machinery such as used in mines." T. McKie and Associated Electrical Industries, Ltd. December 1st, 1933. (423691.)

36682. "Electric water heaters." Santon, Ltd., and H. C. Sanders. December 30th, 1933. (423820.)

**1934**

1593. "Electric signalling systems." General Electric Co., Ltd., and D. C. Espley. January 16th, 1934. (423824.)

1994. "Mechanical rectifiers for converting alternating-current into unidirectional current." Lodge-Cottrell and L. Lodge. January 19th, 1934. (423825.)

2511. "Stranded electric conductors." Norddeutsche Seekabelwerke Akt.-Ges. January 24th, 1933. (423695.)

3257. "Permanent magnets and methods of manufacturing the same." British Thomson-Houston Co., Ltd. February 1st, 1933. (423897.)

3935. "Television systems." Telefunken Ges. für Drahtlose Telegraphie. February 6th, 1933. (Addition to 34035/33.) (423765.)

6975. "Cathode-ray tubes." Fernseh Akt.-Ges. March 4th, 1933. (423696.)

10276. "Ultra-short-wave generator." Naamlooze Vennootschap Machinerieen-en Apparaten Fabrieken. April 4th, 1933. (423832.)

11847. "Electrostatic condensers." Telefunken Ges. für Drahtlose Telegraphie. April 21st, 1933. (Cognate application, 11848/34.) (423701.)

12199. "Electron-discharge devices." British Thomson-Houston Co., Ltd. April 22nd, 1933. (423702.)

12343. "Thermionic valve arrangements." Marconi's Wireless Telegraph Co., Ltd. April 27th, 1933. (423772.)

12829. "Radio and like modulated carrier-wave receiving apparatus." Marconi's Wireless Telegraph Co., Ltd. April 27th, 1933. (423773.)

12881. "Insulating and cooling compositions for electrical apparatus." British Thomson-Houston Co., Ltd. April 29th, 1933. (423774.)

16756. "Indirectly heated cathodes for electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 7th, 1933. (423903.)

17377. "Magnetic separators." Igranic Electric Co., Ltd. June 17th, 1933. (423650.)

18980. "Method of making mercury switches." W. W. Triggs (Adlake Co.). June 27th, 1934. (423708.)

19565. "Swivelling couplings for electrical apparatus." H. Asklund. July 3rd, 1934. (423841.)

23149. "Separable electrical contact devices." Cinch Manufacturing Corporation. September 9th, 1933. (423842.)

25571. "Electric resistance-condenser combinations for filtering purposes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 30th, 1933. (423721.)

26427. "Reproducing mechanism for facsimile telegraph systems." C. Lorenz Akt.-Ges. September 19th, 1933. (423846.)

26961. "Circuit arrangement for effecting switching operations by means of current impulses of short duration." T. Bronee. September 26th, 1933. (423725.)

27055. "Electrically driven vacuum cleaners." Electrolux, Ltd. September 26th, 1933. (423726.)

29390. "Electric meters." H. Nehls and D. L. Keiser. October 13th, 1934. (423849.)

33730. "Electrically driven vacuum cleaners." Electrolux, Ltd. December 13th, 1933. (423733.)

35099. "Hydrometers for electric accumulators." Chloride Electrical Storage Co., Ltd., and A. W. Browne. March 22nd, 1934. (Divided out of 20488/33.) (423913.)

# Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 27th :—

Alternalux. No. 557324; also Whitelux, No. 557325. Class 4. Carbons for electrical purposes.—Charles H. Champion & Co., Ltd., National House, 60-66, Wardour Street, W.1.

Sterlita. No. 552370. Class 8. Clock-actuated electric switches for lighting systems.—George Benjamin Stern, 5, Merton Lodge, Park Road, Shanklin, Isle of Wight.

Hyperite. No. 556485. Class 8. Electric cables and flexibles. No. 556486. Class 40. Wire insulated or sheathed with india-rubber and used for electrical purposes.—British Insulated Cables, Ltd., Prescot, Lancs.

Igranitl. No. 556973. Class 8. Automatic apparatus for controlling the correct interval between the establishment of successive connections in electric motors.—Igranic Electric Co., Ltd., 147, Queen Victoria Street, E.C.4.

British Belplastic (lettering and design). No. 557101. Class 50. Compositions mouldable under pressure, or heat and pressure, made from or having a base of cellulose acetate or other derivatives of cellulose or synthetic or natural resins, sold in the form of sheets, bands, films, rods and tubes, and articles made from such compositions.—Belplastic, Ltd., Hayden's Place, Portobello Road, W.11.

# Standards of Radio Frequency

FOR some time the International Union for Radio Research has organised special radio emissions for the international comparison of standards of frequency. Agreement to one part in ten million has been attained, but differences have been noted in the modes of arrival of the emitted wave, and on the occasion of the next international transmission during the night of March 12th-13th, 1935, it is hoped to obtain the co-operation of persons and institutions possessing suitable apparatus to assist in the study of these differences.

The intercomparison measurement is made by observing "beats" between two frequencies which are very nearly equal. In the past a musical note of 1,000 cycles per second has been generated at the National Physical Laboratory, as a "frequency of reference," and it has been emitted as a modulation of a carrier wave by the British Broadcasting Corporation from two different stations simultaneously. It was found that there were distinct differences in the steadiness of the frequency arriving by the two routes. At distances of 400 to 800 km. there was a slight variability of the modulation frequency arriving by the lower carrier frequency, 200 kc. The variability was much more pronounced at 877 kc.

On the occasion of the next emission (1935) the British Broadcasting Corporation is to modulate Droitwich and the Scottish Regional and Scottish National stations simultaneously with the frequency of 1,000 cycles per second. A great part of England will be in the "fading" area of the Scottish stations, and it is for physical observations, among which "fading" is an important phenomenon, rather than for quantitative measurements, that the two Scottish stations are being provided. The main emission will last continuously for an hour and a half, preceded and followed by shorter ones for subsidiary purposes.

The National Bureau of Standards, Washington, U.S.A., is co-operating by a special emission of a frequency of reference of 5 million cycles per second. This is expected to be accurate to 1 cycle per second, and to be of sufficient intensity to be received satisfactorily in Europe. It is requested that persons and institutions having suitable oscillograph apparatus will assist by making observations. More detailed information is obtainable from Dr. E. H. Rayner, chairman, Commission I (Standards), Union Radio Scientifique Internationale, National Physical Laboratory, Teddington, Middlesex.

# New Work for Contractors

## Particulars of new works and building schemes for the use of electrical installation contractors and traders

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Abram.**—Electric lighting installation to fifty houses in Bamfurlong; W. H. Roby, clerk.

**Barnsley.**—Block of premises for the Permanent Building Society; J. R. Wilkinson, architect, 15, Regent Street.

**Berkshire.**—School, Tilehurst, and extensions to County Boys' School and Girls' School, Windsor, for County E.C.

**Birkenhead.**—Development of Derby House Estate; Second North Provincial Property Co., Ltd. Development of Walker Park Estate; N. Griffiths (Birkenhead), Ltd. Shops and houses, Tranmere Hall Estate; W. M. & M. W. Shennan. School, Prenton, for E.C.

**Birmingham.**—Cinema, 84-88, Alcester Road; H. W. Weedon, architect, 84, Colmore Row. Telephone exchange, Newhall Street; W. J. Whittall & Sons, builders, Lancaster Street.

**Bishopthorpe** (YORKSHIRE).—Houses (21), North Lane, Dringhouses; Pearson & Blackwell, Ltd.

**Brighton.**—Houses, Hollingbury Copse Estate, Surrenden Road; G. W. Warr. Houses (68), Manor Farm Estate; borough surveyor.

**Bursiem.**—Houses (52), Station Road and Sun Street; A. G. Owen.

**Burton-on-Trent.**—Senior school (£23,414), for Borough E.C.; George Hodges & Son, Ltd., builders.

**Camborne.**—Houses (24), Camborne; U.D.C. surveyor.

**Charlton.**—Houses (378), Park Estate (£169,500); L.C.C. architect.

**Chelmsford.**—Public buildings, Rainsford House; borough engineer. Schools for Borough E.C.; director of education.

**Cheltenham.**—Alterations and additions to Hotel Majestic, Park Place; Miss K. Bayliss. Rebuilding, 117-9, High Street; Marks & Spencer. Reconstruction of business stores, with shopping arcade (£100,000), for Shirer & Haddon, Ltd. Church, Whaddon Farm Estate; Rev. Canon Johnstone.

**Cheshire.**—Senior school, Harrytown, Bredbury, for County E.C.; F. A. Browne, county architect, Chester.

**Chester-le-Street.**—Houses (912); M. Wilson, R.D.C. surveyor.

**Clacton-on-Sea** (ESSEX).—Cinema, for the Odeon Theatre, Ltd.

**Cowley** (OXFORDSHIRE).—Houses (140), Littlemore Road; Pye Bros.

**Cumnock.**—Houses, Glaisnock Street and Herdston Place; burgh surveyor.

**Deptford.**—Telephone exchange for H.M. Office of Works.

**Devonshire.**—Senior schools, Chagford; H. V. de C. Hague. county architect, Exeter.

**Dudley.**—Houses (37), Tipton Road; W. Lindley. Extensions to works, Vine Street, for Dudley Drop Forging Co., Ltd.

**Dulwich.**—Reconstruction of Constance Road Institution (£13,935); L.C.C. architect.

**Dumbarton.**—School (£35,000); burgh surveyor.

**Durham.**—Additions to Seaham Girls' Secondary School; F. Willey, architect, 34, Old Elvet, Durham.

**Eccles.**—Houses (42), Lynn Avenue; Wilham Estates, Ltd.

**Erith.**—Schools, Bedonwell Hill, for E.C.; U.D.C. surveyor.

**Essex.**—High School, Dagenham (£51,000); V. G. Selwood & Co., builders, Chelmsford. High School, Brentwood (£34,429); Hosking & Son, builders, Rayleigh. Junior and infants' school, Upshire, for County E.C.

**Faringdon.**—Houses (64); J. W. Harris, architect, Willesleigh, East Challow, Wantage.

**Finchley.**—Library, Ravensdale Avenue; borough engineer.

**Glamorganshire.**—Schools, Penllergaer and Whitchurch, for County E.C.

**Greenock.**—R.C. Church, Port Glasgow Road, for the Rev. Donald Macintosh, R.C. Archbishop, Glasgow.

**Guildford.**—School (700 places), for Borough E.C.; T. R. Clemence, architect.

**Hadleigh** (ESSEX).—Cinema; Mrs. M. E. Stanton Rolls, builder, 14, Victory Parade, Sutton Road, Southend-on-Sea.

**Halifax.**—Houses (230), Pellon; borough engineer. Block of flats, Hunger Hill, for Halifax Housing Improvements, Ltd.

**Hanley.**—Houses (86), Leek Road, Bucknall; J. Withington. Houses (33), Shelton New Road, Cliffe Vale; G. H. Broad. Factory, Clough Street; Astin & Sons.

**Haslemere.**—Houses (100), Hilders Estate; U.D.C. surveyor.

**Hatfield.**—Houses (80); R.D.C. surveyor.

**Headington** (OXFORDSHIRE).—Houses (30), New Cross Road: R. C. Munt.

**Hereford.**—Houses (132), Hinton Court; Nicholson & Clarke, architects. Cinema, Commercial Road, for L. Morris; Leslie H. Kemp & Tasker. School, St. Martin's area, for E.C.

**Hither Green.**—Houses (60), Manor Estate; Manor Estates (Hither Green), Ltd.

**Huddersfield.**—Cinema, Cloth Hall site, for the Union Cinema Co. Public library and art gallery (£80,000), electrical work and lift; W. Jaggar, borough engineer.

**Hull.**—School, Endike Lane (£27,900), for E.C.; Robinson & Sawdon, Ltd., builders.

**Kenilworth.**—Houses (30); F. J. Aitken; builder.

**Kent.**—Enlargement to boys' county school, Gillingham; county architect.

**Kingston-on-Thames.**—School, Latchmere area; borough engineer.

**Kirkcaldy.**—Houses (700); G. Duffus, burgh surveyor.

**Lancashire.**—Junior and infants' school, Liverpool Road. Penwortham; Stephen Wilkinson, county architect, County Offices, Preston. Senior schools, Rishton, for County E.C.; director of education, Preston.

**Leicester.**—Cinema, Townsend Road, Enderby, for T. Chesterton, Newbold-de-Verdon, Desford; J. West, builder, High Street, Enderby, Narborough.

**London.**—(BOW).—Extensions to Fairfield Works, for Bryant & May, Ltd. (CHELSEA).—Houses (68), New Street, near Draycott Avenue; Cadogan Estate Developments, Ltd. Shops and flats, Whitelands College site, King's Road; Verity & Beverley, 7, Sackville Street, W.1. (E.C.).—Fire brigade headquarters, Albert Embankment (£273,000); L.C.C. architect. (KENNINGTON).—Dwellings, Park Estate (£76,000); L.C.C. architect. (POPLAR).—Reconstruction of Cubitt Town School (£44,575); L.C.C. architect.

**Manchester.**—Flats (2,000), various estates; city architect.

**Mansfield.**—Houses (52), Ravensdale Estate, and swimming establishment (£30,000); borough engineer.

**Margate.**—Infant welfare centre and school clinic, College Road; W. R. H. Gardner, architect, 9, Cecil Square.

**Middlesbrough.**—Houses (22); Kitching & Co., architects, 21, Albert Road.

**Morecambe.**—Houses (26), Charles Avenue and South Road; C. F. Napper. Swimming pool (£60,500); Sir Lindsay Parkinson & Co.

**Newton Abbot** (DEVONSHIRE).—Cinema, for the Odeon Theatre, Ltd.

**North Shields.**—New premises for the local Co-operative Society; W. Stockdale, architect, Howard Street.

**Ongar.**—Senior school (£21,080); T. J. Bailey & Son, Chelmsford.

**Oxford.**—Houses (67), Iffley Turn; F. A. Sutton. Houses (115), Wolvercote Estate, and baths, Hinksey site; city engineer. School, Florence Park (£24,885); G. Walker & Slater, Ltd., Derby. Extensions to Eye Hospital, Walton Street; governors.

**Oxfordshire.**—School, Rose Hill Estate, Oxford, for County E.C.

**Rawtenstall.**—School, Crawshawbooth; borough engineer.

**Reading.**—Extensions to Royal Berkshire Hospital (£80,000), for the governors; clerk.

**Rotherham.**—Houses (35), electrical work; A. E. Lant, surveyor, Grove Road, Moorgate, near Rotherham.

**Scarborough.**—Development of Scalby Mills Estate (£55,000); borough engineer.

**Seaham Harbour.**—Houses (170); U.D.C. surveyor.

**Sheffield.**—Houses (21), East Bank Road; G. R. Parkin. Houses (26), Newlands Grove; Hallewell Estates, Ltd. Estate development of Mulehouse Lane; Fowler & Marshall.

**Shipley.**—Senior school, Saltaire Road, for E.C.

**Sittingbourne.**—Cinema; F. Mitchell, architect.

**Sleaford.**—Houses (72); Jacques & Greaves, builders, Doncaster.

**Slough.**—Cinema, Grove Parade, electrical work; L. H. Kemp and Tasker, architects, 10, Gt. St. James' Street, Bedford Row, London, W.C.1.

**Southend-on-Sea.**—Rebuilding of business stores, Hamlet Court Road, for R. Havens.

**Southport.**—Schools, Grantham Road, for R.C. managers; priest-in-charge.

**Steyning.**—Alterations and additions to Grammar School for governors; C. G. Stillman, architect, North Street, Chichester.

**Stirlingshire.**—School for physically and mentally defective children, Falkirk (£25,000), for C.C.; architect, County Education Committee, Stirling.

**Stoke-on-Trent.**—Houses (28), Hamilton Road, Dresden; G. F. Norris. Houses (30), The Hawthorns, Stone Road, Trent Vale; Birchenwood Brick & Tile Co., Ltd. Houses (204), Hunterscroft, Penkhull; H. Bratt. Maternity hospital; city architect. Museum, art gallery and library, and school, Meir (No. 3) site; city engineer.

**Sutton Coldfield.**—Cinema, Birmingham Road (£25,000); W. W. Weeden, architect, 84, Colmore Row, Birmingham.

**Sutton-in-Ashfield.**—Houses (100), Carsic Lane; Warner & Dean, architects, Mansfield Road.

**Swaffham.**—Houses (50), Back Lane site; C. Cordy, builder, Hingham.

**Taunton.**—Extensions with electrical heating work (£25,000), for the Taunton & Somerset Hospital; T. A. Lodge, of Lanchester & Lodge, architects, Bedford Square, London, W.C.1.

**Tottenham.**—Extensions to factory, West Road; Weber & Phillips, Ltd.

**Tunstall** (STAFFS).—Houses (88), High Street, Sandyford; J. Smith.

**Walton-on-the-Naze.**—Electricity showrooms and offices, Newgate Street; H. Collins, borough engineer, Town Hall, Colchester.

**Warrington.**—Houses (60), near Chester Road; Woosey & Walton. Houses (61), Hallfields Estate; R. & S. Smith. Factory, Wilderspool Causeway; J. Bennett & Co. Extensions to works, Back Aitken Street; Whitecross Co., Ltd.

**Warwickshire.**—Elementary school for juniors and infants, Hillmorton Paddox, Rugby, for County E.C.; A. C. Bunch, county architect, Shire Hall, Warwick.

**Welwyn Garden City.**—Houses (85); G. R. Barnsley, architect, 7, Grosvenor Street, London, W.1.

**West Suffolk.**—High school for girls, Sudbury, for County E.C.; county architect, Bury St. Edmunds.

**Whitley Bay.**—Houses (26); Gofton & Sons, builders, Uplands.

**Worthing.**—Block of shops and offices, Liverpool Road, for H. P. Brazier; Sir Aston Webb, architect, London, S.W.1.

**Wrexham.**—Houses (20), Aston Grove; E. W. Gittins & Sons, builders, Aberderfyn.

**Yeadon** (YORKSHIRE).—Houses (56), Henshaw Lane; surveyor, Town Hall.

**York.**—Houses (24), Fulwood Road; A. Temple. Houses (30), Livingstone Road; J. N. Dunn. Houses, Water Lane Estate; city engineer. Catholic church, Huntingdon; trustees. Development of Nunthorpe Park Estate, for Sir Algar Meysey-Thompson; Newsam & Gott, architects. School, Osbaldwick Lane, for E.C. Additions to Lendal Galleries; I. Walton & Co., Ltd. Extensions to Bar Convent School, Blossom Street; Rev. Mother Superior.